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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 161)

DECEMBER 1976

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

STAR (N-10000 Series)	N76-30147—N76-32123
IAA (A-10000 Series)	A76-41507—A76-44716

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NASA SP-7011 (161)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 161)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in November 1976 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 171 reports, articles and other documents announced during November 1976 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1976 Supplements.

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche[1] are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., (A76-13400), when requesting publications.

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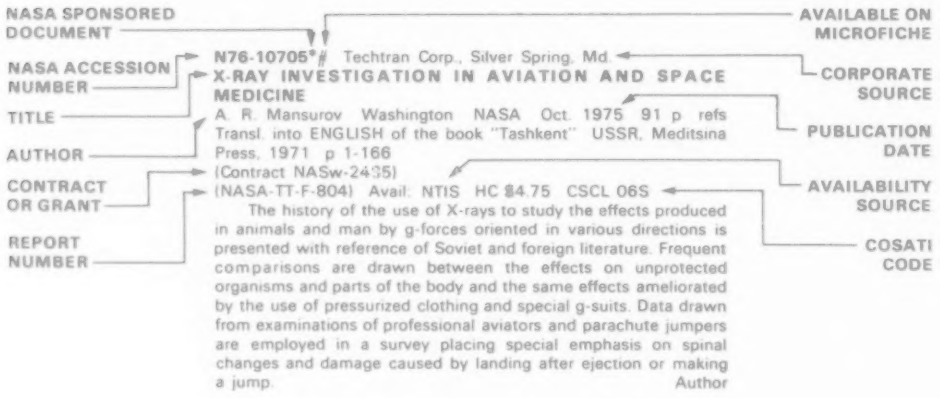
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N76-10705*# Techtran Corp., Silver Spring, Md.
X-RAY INVESTIGATION IN AVIATION AND SPACE MEDICINE
A. R. Mansurov Washington NASA Oct. 1975 91 p refs Transl. into ENGLISH of the book "Tashkent" USSR, Meditsina Press, 1971 p 1-166
(Contract NASw-2435)
(NASA-TT-F-804) Avail: NTIS HC $4.75 CSCL 06S
The history of the use of X-rays to study the effects produced in animals and man by g-forces oriented in various directions is presented with reference of Soviet and foreign literature. Frequent comparisons are drawn between the effects on unprotected organisms and parts of the body and the same effects ameliorated by the use of pressurized clothing and special g-suits. Data drawn from examinations of professional aviators and parachute jumpers are employed in a survey placing special emphasis on spinal changes and damage caused by landing after ejection or making a jump. Author

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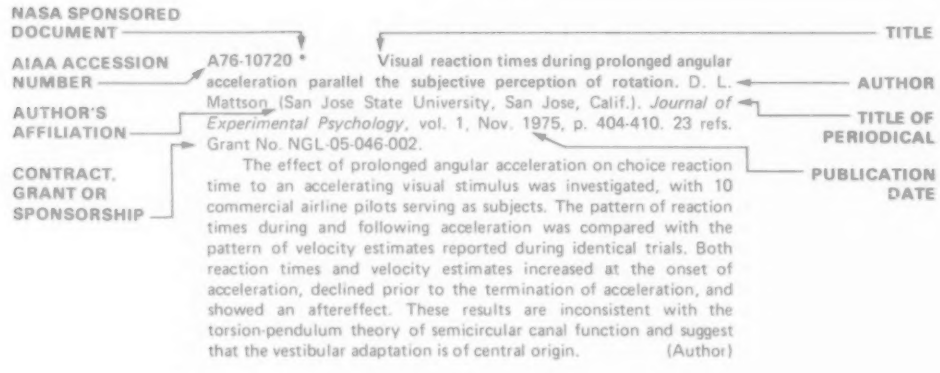
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PUBLICATION DATE
A76-10720 * Visual reaction times during prolonged angular acceleration parallel the subjective perception of rotation. D. L. Mattson (San Jose State University, San Jose, Calif.). *Journal of Experimental Psychology*, vol. 1, Nov. 1975, p. 404-410. 23 refs. Grant No. NGL-05-046-002.
The effect of prolonged angular acceleration on choice reaction time to an accelerating visual stimulus was investigated, with 10 commercial airline pilots serving as subjects. The pattern of reaction times during and following acceleration was compared with the pattern of velocity estimates reported during identical trials. Both reaction times and velocity estimates increased at the onset of acceleration, declined prior to the termination of acceleration, and showed an aftereffect. These results are inconsistent with the torsion-pendulum theory of semicircular canal function and suggest that the vestibular adaptation is of central origin. (Author)

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 161)

DECEMBER 1976

IAA ENTRIES

A76-41507 **Blood viscosity in man following decompression - Correlations with hematocrit and venous gas emboli.** T. S. Neuman, N. G. Harris, and P. G. Linaweaver, Jr. (U.S. Navy, Naval Undersea Center, San Diego, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1975, p. 803-807. 31 refs.

A76-41508 **Effect of ethyl alcohol on ionic calcium and prolactin in man.** J. M. Earll, K. Gaunt, L. A. Earll, and Y. Y. Djuh (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 808-810. 24 refs.

A76-41509 **Effect of space flight factors on the mammal - Experimental-morphological study.** V. V. Portugalov, E. A. Savina, A. S. Kaplanskii, V. I. Iakovleva, G. I. Plakhuta-Plakutina, A. S. Pankova, P. I. Katunian, M. G. Shubich, and S. A. Buvailo (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 813-816. 17 refs.

Morphological examination of 27 rats that were sacrificed on the 1st-2nd and 26-27th days after a 22-day spaceflight showed that the space flight had produced no significant changes in the structural organization of vital organs of the animals. However, the space flight led to the development of morphologically visible changes in individual organs and systems (musculo-skeletal system, hemopoietic organs, hypothalamic-pituitary-adrenal system, renal juxtaglomerular system). The detected changes are reversible, nonspecific, and develop in animals exposed to ground-based hypokinetic and other stress experiments. (Author)

A76-41510 * **Hypergravity effects on normal and avulsed developing avian radii.** J. A. Negulesco and D. L. Clark (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 821-825. 30 refs. Grant No. NIH-5409; Contract No. NAS2-6634.

Rhode Island red female chicks were subjected to complete closed fracture of the right radius at 2 weeks post-hatching. The animals were allowed to heal for 1 week at either earth-gravity or 2-G-hypergravity state with control and estrogen-injected groups. Intact and fractured radial length, weight, average epiphysial-diaphysial diameters, and length, width, and weight of healing fracture callus were measured. Daily 2000 IU estrogen administration for 7 d increased intact radial length. Estrogen augments the effects of the 2-G state by inhibiting growth and depleting the mass of both intact and fractured radii and by decreasing the average distal epiphysial diameter of fractured bones. Animals exposed to the hypergravity state without hormonal treatment showed decreased fractured radial length, weight, and smaller proximal epiphysial diameters. The measurable parameters of the fracture callus (width, length, and weight) were depressed by the hypergravity state regardless of whether the animal was untreated or supplemented with estrogen. (Author)

A76-41511 * **Accumulative effects of 2 weeks' exposure to a 2-G hypergravity state and estrogen treatment upon intact and fractured radii of young female birds.** J. A. Negulesco (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 826-830. 27 refs. Grant No. NIH-5409; Contract No. NAS2-6634.

A76-41512 **LDH isoenzymes of skeletal muscles of rats after space flight and hypokinesia.** V. V. Portugalov and N. V. Petrova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 834-838. 13 refs.

Carbohydrate metabolism of the red-soleus and mixed-plantaris muscles of rats was studied during their exposure to weightlessness and hypokinesia. With respect to the isoenzyme spectrum of LDH (lactate dehydrogenase), it is shown that the red and mixed muscles reacted differently to 22-day orbital flight and hypokinetic exposure. The greatest changes of the LDH spectrum in the soleus muscle were found on the 15th hypokinetic day. These changes were similar to the spaceflight induced changes in the soleus muscle of rats. The most significant changes of the LDH spectrum in the plantaris muscle were detected on the 60th hypokinetic day. No differences were found in the LDH spectrum of the plantaris muscle between the flight and control animals. The experiment indicates that disturbances in carbohydrate metabolism play a major part in atrophic and dystrophic developments in skeletal muscles subjected to a reduced functional load. (Author)

A76-41513 **Simplified body-composition analysis using deuterium dilution and deuteron photodisintegration.** M. J. Stansell and A. K. Hyder, Jr. (U.S. Air Force Academy, Colorado Springs, Colo.). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 839-845. 37 refs. USAF-sponsored research.

The use of deuterium dilution as a procedure for assessing body composition has been hampered by the complexity of measuring deuterium at low concentrations. The simplified scheme proposed for quantifying low levels of deuterium in body fluid samples promises to expand the use of D2O in body composition studies. The deuterons are quantified by measuring the neutron emission induced by gamma-ray irradiation from Th-228 (2.61 MeV). The in vitro aspects of the procedure exhibit coefficient of variation of under 1% throughout the range of assay and near 100% recovery of added D2O. In vivo comparison studies with a reference tritium dilution procedure indicate close agreement in a group of 38 subjects. The main advantages of the procedure are a small oral dose of D2O and the use of either serum or urine samples. V.P.

A76-41514 **Metabolic and hormonal mechanisms of mineral metabolic adaptation to induced hypokinetics in rats.** H. Saiki, M. Nakaya, Y. Sugita, and M. Kamachi (Jikei University, Tokyo, Japan).

Aviation, Space, and Environmental Medicine, vol. 47, Aug. 1976, p. 846-852. 13 refs.

A76-41515 Morphological manifestations of functional changes in the hypothalamic-pituitary neurosecretory system and kidneys of rats after space flight. E. A. Savina, A. S. Pankova, E. I. Alekseev, and V. K. Podymov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 853-855. 13 refs.

Morphological examination of the hypothalamic-pituitary neurosecretory system and kidneys of rats flown for 22 d and sacrificed 2 and 27 d postflight was carried out. By histological and histochemical methods, indications of increased activities of the hypothalamicpituitary neurosecretory system and the juxtaglomerular apparatus of kidneys were found. The changes were reversible and by the 27th postflight day returned to the normal. It is suggested that the changes in the above systems may be produced not only by flight effects but also by readaptation of animals to 1 g. (Author)

A76-41516 Comparison of the subjective intensity of sinusoidal, multifrequency, and random whole-body vibration. R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 856-862. 7 refs.

An intensity matching technique was used to test the independent component method for evaluating complex vibration environments, recommended by current vibration standards. In one experiment, seated subjects adjusted the intensity of a 25 Hz sinusoid to match the subjective intensity of 11, 17, 40, and 63 Hz sinusoids, presented either singly or in combinations of two, three, or four frequencies. In another experiment, 25 Hz was again used to match the subjective intensity of third-octave bands of random vibration with center frequencies of 16, 20, 25, 31.5, and 40 Hz, presented either singly or in combinations of two, three, or four bands. The results showed that the acceleration of the matching response increased significantly as the number of sinusoids or third-octave bands in the stimulus increased. This indicates that the independent component evaluation method will underestimate the severity of complex vibration environments, and suggests that their perceived intensities may be more accurately reflected by the weighting technique included in the standards as an alternative evaluation method. (Author)

A76-41517 Hematologic changes in man during decompression - Relations to overt decompression sickness and bubble scores. R. F. Goad, T. S. Neuman, and P. G. Linaweaver, Jr. (U.S. Navy, Medical Dept., San Diego, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 863-867. 32 refs.

In order to determine whether asymtomatic gas phase separation causes hematologic abnormalities, studies were carried out following two dive series, one to 210 feet of sea water (FSW) for 50 min and the other to 132 FSW for 30 min. Studies included white and red cell count, red cell indices, platelet count, ESR, fibrinogen, fibrin split products, prothrombin time, partial thromboplastin time, coagulation factors II, V, VII, VIII, and X, clot retraction, platelet aggregation and adhesion, euglobulin lysis time, and platelet factor III. Changes were seen in platelet and white cell count, prothrombin time and partial thromboplastin time. White cell count was the only variable which correlated with total bubble score. The results are presented and implications of the findings discussed. (Author)

A76-41518 * Sopite syndrome - A sometimes sole manifestation of motion sickness. A. Graybiel and J. Knepton (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 873-882. 22 refs. NASA Order T-5904-B; MR Project 041,01,01,0120.

Sopite syndrome is understood to mean a symptom complex centering around 'drowsiness' produced by motion sickness. The typical symptoms of the syndrome are: yawning; drowsiness; disinclination to work either physically or mentally; and lack of participation in group activities. The present study is based on data obtained in rotating rooms, at sea, in the air, and in orbital flight. When the sopite syndrom occurs either before other typical symptoms of motion sickness appear or after their disappearance, they are distinguished, respectively, by the terms 'early sopite syndrome' and 'late sopite syndrome'. Further distinction is made between brief and prolonged exposures. Evidence is presented indicating that drowsiness and mental depression caused by prolonged motion sickness are only part of the symptom complex that is termed sopite syndrome. V.P.

A76-41519 * A Z-axis recumbent rotating device for use in parabolic flight. A. Graybiel (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.) and E. F. Miller, II. *Aviation, Space, and Environmental Medicine*, vol. 47, Aug. 1976, p. 893. NASA Order T-5904-B.

A prototype apparatus for exposing persons to rotation about their Z-axis in parabolic flight is described. Although it resembles earth-horizontal axis devices, added features are its strength and portability, and the fiber glass 'couch' with adjustable elements providing support and restraint. Even under ground-based conditions, this device provides unique opportunities for investigations involving not only canalicular and macular mechanoreceptors, but also touch, pressure, and kinesthetic receptor systems. (Author)

A76-41792 * The development of a portable cardiac ultrasonoscope. G. Schmidt and H. Miller (Stanford University, Palo Alto, Calif.). In: Western Electronic Show and Convention, San Francisco, Calif., September 16-19, 1975, Technical Papers.
North Hollywood, Calif., Western Periodicals Co., 1975, p. 20/6-1-20/6 5. 6 refs. Grant No. NGR-05-020-634.

This paper describes a new, portable, battery powered echocardioscope developed at the NASA-Ames Research Center for regulator systems, the development of an in-flight physiological data acquisition system, and a photo-computer technique for the design and analysis of personal protective equipment are also treated. B.J.

A76-41862 Cellular basis for the T wave of the electrocardiogram. I. Cohen, W. Giles, and D. Noble (Oxford University, Oxford, England). *Nature*, vol. 262, Aug. 19, 1976, p. 657-661. 14 refs. Research supported by the Medical Research Council, Medical Research Council of Canada, and Muscular Dystrophy Association of America.

Conventional microelectrode techniques are used to record action potentials in isolated preparations from a sheep ventricle. Unexpected, activity-dependent changes in action potential duration are observed in the tests. It is found that the first action potentials from the base and apex are very similar in duration. The ionic currents involved appear, therefore, to be the same in the two regions. It follows that the differences in duration which occur during normal beating, and which are responsible for determining the polarity of the T wave, develop as a consequence of activity. G.R.

A76-42009 Sensomotor coordination (Sensomotorik). Munich, Urban und Schwarzenberg (Physiologie des Menschen, Volume 14), 1976. 517 p. In German. $7.85.

An introduction into motion physiology is provided, taking into account a study of motion characteristics, posture, aspects of learning, sensomotor mechanisms and motor systems, and the pathophysiology of sensomotor coordination. Attention is also given to questions of spinal coordination with respect to posture and motion, the design of peripheral and central sensomotor controls, the cerebral regulation of sensomotor coordination, the cerebellum, and aspects of neurophysiological terminology. G.R.

A76-42011 # **Engineering psychology (Inzhenernaia psikhologiia).** G. K. Sereda, S. P. Bocharova, G. V. Repkina, and B. A. Smirnov. Kiev, Izdatel'skoe Ob'edinenie Vishcha Shkola, 1976. 308 p. 112 refs. In Russian.

The work analyzes practically all problems of engineering psychology as the science of optimization of man/machine interrelationships. It deals with the process of human activity, major characteristics of human mental functions, with particular reference to the possibilities of the practical realization of scientific principles in the theory of information, theory of queueing, statistical simulation, and other related fields. Specific recommendations are set forth regarding the psychological study of a human operator in the presence of scientific technological progress. Throughout the work, use is made of data obtained by Soviet and foreign investigators in the fields of psychology, physiology, design of automated control systems, cybernetics, and theory of reliability. S.D.

A76-42021 # **Elements of the theory of man-machine systems (Nachala teorii ergaticheskikh sistem).** V. V. Pavlov. Kiev, Izdatel'stvo Naukova Dumka, 1975. 240 p. 66 refs. In Russian.

The elements of the theory are treated from the point of view of an approach incorporating the principles of both the control theory and the theory of living systems. Particular attention is given to independent man-machine control systems and such which form an element of a more complex system. A mathematical apparatus is developed for synthesizing the structure and distribution of functions between the human operator and the control devices. V.P.

A76-42044 # **Organization of work - Psychophysiological problems of monitoring and control (Organizatsiia truda - Psikhofiziologicheskie problemy kontrolia i upravleniia).** J. Neumann and K.-P. Timpe. Moscow, Izdatel'stvo Ekonomika, 1975. 103 p. In Russian. (Translation).

The book investigates the psychological and physiological conditions for assuring best working conditions in connection with activities of monitoring and control of automated industrial processes. Topics discussed include spatial compactification of information, control desk design, display organization, the effect of noise on work performance, illumination of the work area, the effect of color on the organism, control of microclimate of the work area, design of control organs, optimization of indicators, spatial allocation of control organs and indicators, the variation of work capacity during the course of the work period, and stability of concentration and alertness during work on automated devices. P.T.H.

A76-42055 * **Sequence characterization of 5S ribosomal RNA from eight gram positive procaryotes.** C. R. Woese, K. R. Luehrsen, C. D. Pribula, and G. E. Fox (Illinois, University, Urbana, Ill.). *Journal of Molecular Evolution*, vol. 8, Aug. 3, 1976, p. 143-153. 20 refs. Grants No. NSG-7044; No. NIH-AI-6457.

Complete nucleotide sequences are presented for 5S rRNA from Bacillus subtilis, B. firmus, B. pasteurii, B. brevis, Lactobacillus brevis, and Streptococcus faecalis, and 5S rRNA oligonucleotide catalogs and partial sequence data are given for B. cereus and Sporosarcina ureae. These data demonstrate a striking consistency of 5S rRNA primary and secondary structure within a given bacterial grouping. An exception is B. brevis, in which the 5S rRNA sequence varies significantly from that of other bacilli in the tuned helix and the procaryotic loop. The localization of these variations suggests that B. brevis occupies an ecological niche that selects such changes. It is noted that this organism produces antibiotics which affect ribosome function. C.K.D.

A76-42056 **A comparison of maximum oxygen uptake determination by bicycle ergometry at various pedaling frequencies and by treadmill running at various speeds.** G. A. McKay and E. W. Banister (Simon Fraser University, Burnaby, British Columbia, Canada). *European Journal of Applied Physiology*, vol. 35, no. 3, 1976, p. 191-200. 29 refs.

A76-42057 **Relationships of femoral venous /K+/, /H+/, P sub O2, osmolality, and /orthophosphate/ with heart rate, ventilation, and leg blood flow during bicycle exercise in athletes and non-athletes.** U. Tibes, B. Hemmer, D. Böning, and U. Schweigart (Köln, Deutsche Sporthochschule, Cologne, West Germany). *European Journal of Applied Physiology*, vol. 35, no. 3, 1976, p. 201-214. 51 refs. Research supported by the Bundesinstitut für Sportwissenschaft.

The relationships of femoral venous K+, H+ concentration, osmolality (OSM), oxygen tension, and inorganic phosphate Pi concentration with heart rate (HR), ventilation, and calculated leg blood flow were investigated during bicycle exercise in endurance trained (TR) and untrained (UT) test subjects. At a given oxygen uptake level the increases of K+ concentration, H+ concentration, OSM, Pi concentration and the decrease of oxygen tension were significantly lower in TR than in UT. In the same proportion the increases of HR, ventilation and leg blood flow were diminished. Thus in TR and UT identical and highly significantly correlated regression lines were obtained. These constituents changed in the same proportion as the relative oxygen uptake in TR and UT. No relationships with Na+, Ca++, and Mg++ concentrations were found. By means of a multiple regression analysis the partial influence of K+, H+, OSM, oxygen tension, and Pi upon the total change of HR, ventilation, and leg blood flow was estimated, to compare with data from infusion experiments. The findings were discussed in terms of a possible linkage between metabolic events, circulatory, and ventilatory adjustments during work. (Author)

A76-42058 **Comparison of methods to calculate cardiac output using the CO2 rebreathing method.** D. H. Paterson and D. A. Cunningham (Western Ontario, University, London, Canada). *European Journal of Applied Physiology*, vol. 35, no. 3, 1976, p. 223-230. 28 refs. Research supported by the Ontario Department of Health and Physicians Services Incorporated Foundation.

A comparison was made of methods used to calculate cardiac output by the indirect (CO2) Fick procedure (equilibrium method). Alternative methods for calculation of arterial PCO2, mixed venous PCO2, and conversion of gas tension to content were tested. Cardiac output values determined with a corrected equilibrium PCO2, to approximate mixed venous PCO2, were observed to be closest to cardiac output values determined on similar populations by the dye dilution method. Arterial PCO2 was best estimated from the Bohr equation using a dead space in exercise from prediction equations in the literature applicable to the populations under study. CO2 dissociation curves used to derive the veno-arterial CO2 content difference, were shown to differ considerably. (Author)

A76-42086 **Simulation of a remotely piloted vehicle/drone control facility using SAINT.** D. B. Wortman, S. D. Duket (Pritsker and Associates, Inc., West Lafayette, Ind.), and D. J. Seifert (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Summer Computer Simulation Conference, San Francisco, Calif., July 21-23, 1975, Proceedings. Volume 1.
Montvale, N.J., AFIPS Press, 1975, p. 508-517. 12 refs. Contract No. F33615-75-C-5012.

Systems analysis of integrated networks of tasks referred to as SAINT provides the simulation concepts necessary to model man and machine in the face of enviromental factors. A remotely piloted vehicle/drone control facility (RPV/DCF) is designed to simulate, in a real-time environment, a mission consisting of a group of RPVs flying to a target and returning to home base. The paper discusses both the SAINT modeling and simulation technique and the SAINT model of the RPV/DCF. Decomposing an overall system into its components and then providing a vehicle to integrate the components into system performance measures is in the true spirit of the systems approach to problem solving. SAINT is shown to be a powerful tool in the modeling and analysis of complex systems. S.D.

A76-42211 **Measuring the duration of perception.** L. Matin and R. W. Bowen (Columbia University, New York, N.Y.). *Perception and Psychophysics*, vol. 20, no. 1, July 1976, p. 66-76. 10 refs. NSF Grant No. BMS-73-01463; Grant No. NIH-EY-00375.

The paper develops a general framework for dealing with the duration of perception in the context of simultaneity judgements (offset-onset judgements), presents some new ways of using simultaneity judgements to measure the duration of perception, and provides a theoretical basis for some experimental tests of the underlying assumptions, particularly those regarding certain possible biases. Data are presented from an experiment which employed the new method to demonstrate by example how a test for bias may be evaluated. No significant biasing effects are detected in the measures of perceived duration as either retinal location or background luminance is changed, although background luminance markedly influences the values of perceived duration. The new method is more efficient than earlier methods when three or more perceived durations need to be determined. S.D.

A76-42212 * **The effect of attention loading on the inhibition of choice reaction time to visual motion by concurrent rotary motion.** M. Looper (San Jose State University, San Jose, Calif.). *Perception and Psychophysics*, vol. 20, no. 1, July 1976, p. 80-84. 20 refs. Grant No. NGL-05-046-002.

This study investigates the influence of attention loading on the established intersensory effects of passive bodily rotation on choice reaction time (RT) to visual motion. Subjects sat at the center of rotation in an enclosed rotating chamber and observed an oscilloscope on which were, in the center, a tracking display and, 10 deg left of center, a RT line. Three tracking tasks and a no-tracking control condition were presented to all subjects in combination with the RT task, which occurred with and without concurrent cab rotations. Choice RT to line motions was inhibited (probability less than .001) both when there was simultaneous vestibular stimulation and when there was a tracking task; response latencies lengthened progressively with increased similarity between the RT and tracking tasks. However, the attention conditions did not affect the intersensory effect; the significance of this for the nature of the sensory interaction is discussed. (Author)

A76-42224 **Effects of treadmill exercise on the timing of the heart and arterial sounds, and the slope of the brachial arterial pulse wave.** Y. Inagaki (City of Hope Medical Center, Duarte, Calif.; Chiba, University, Chiba, Japan), M. Wassermil (City of Hope Medical Center, Duarte; Presbyterian Intercommunity Hospital, Whittier, Calif.), and S. Rodbard. *American Heart Journal*, vol. 92, Sept. 1976, p. 283-289. 20 refs.

A76-42225 **Real-time observation of cardiac movement and structures in congenital and acquired heart diseases employing high-speed ultrasonocardiotomography.** K. Nishimura, N. Hibi, T. Kato, Y. Fukui, T. Arakawa, H. Tatematsu, A. Miwa, H. Tada, T. Kambe, and K. Nakagawa (Nagoya University, Nagoya; Toshiba Tamagawa Works, Kawasaki, Japan). *American Heart Journal*, vol. 92, Sept. 1976, p. 340-350. 16 refs.

Conventional one-dimensional echocardiography cannot easily visualize the anatomical relationships of various cardiac structures. To overcome this limitation, high-speed ultrasonocardiotomography with a sonolayergraph provided with a logarithmic amplifier is proposed for real-time observation of cardiac structures. The device yields 30 or 36 images per second by a mechanically operated single flat or 75 mm focus transducer measuring 10 mm in diameter. The angle of a sector image composed of about 120 scanning lines is arbitrarily changeable within 0-65 deg. The fast succession of images allows clear observation of the movement of cardiac structures in real time. A clinical study of 230 patients by means of the proposed system reveals that ultrasonocardiotomography is advantageous as a fast and reliable noninvasive tool to provide two-dimensional echocardiograms for cardiac diagnosis and assessment. S.D.

A76-42314 **Determination of power absorption in man exposed to high frequency electromagnetic fields by thermographic measurements on scale models.** A. W. Guy, M. D. Webb, and C. C. Sorensen (Washington, University, Seattle, Wash.). *IEEE Transactions on Biomedical Engineering*, vol. BME-23, Sept. 1976, p. 361-371. 8 refs. U.S. Department of Health, Education, and Welfare Grant No. 16-P-56818-013; Contract No. F41608-75-C-0021.

When the body of man, small compared to a wavelength, is exposed to high frequency (HF) electromagnetic (EM) fields, the absorbed power density patterns and total absorbed power may be approximated by the simple superposition of the internal electric fields obtained from the quasistatic coupling characteristics of the electric and magnetic field components determined independently. These characteristics were obtained for full scale man by thermographic studies of power absorption in scale models of man exposed to fields at frequencies scaled up inversely proportional to the model size. A VHF resonant cavity was used to provide the necessary field strengths for producing measurable power absorption patterns under simulated HF exposure conditions. The results indicate that peak power absorption densities as high as 5.63 W/kg can be produced in man exposed to 10 mW/sq cm 31 MHz radiation fields. The results show that the absorption decreases as the square of the frequency as predicted by theory for frequencies below 31 MHz. (Author)

A76-42315 **Interaction of two cross-polarized electromagnetic waves with mammalian cranial structures.** J. C. Lin (Wayne State University, Detroit, Mich.). *IEEE Transactions on Biomedical Engineering*, vol. BME-23, Sept. 1976, p. 371-375. 13 refs. U.S. Department of Health, Education, and Welfare Grant No. 16-P-56818-012; NSF Grant No. ENG-75-15227; Grant No. PHS-R01-FD-00646.

A study has been made of the interaction of two cross-polarized plane electromagnetic waves with six-layered spherical models of a mammalian head. The numerical results indicate that the absorbed powers induced inside small animal and human heads by incident circularly polarized waves and linearly polarized waves are very similar except that the absorbed power in the planes transverse to the direction of propagation is uniform for the cross-polarized wave. It is also shown that the average absorbed power depends strongly on the frequency and head size involved. The maximum absorbed powers in a given size spherical head vary only slightly with frequency for the two frequencies studied. However, since a greater amount of the absorbed power occurs in the inner sphere representing the brain of a human head when 918 MHz rather than 2450 MHz is used, the former constitutes a greater health hazard to man at the same incident power. (Author)

A76-42316 **Prediction of inhalation time/exhalation time ratio during exercise.** A. T. Johnson (Maryland, University, College Park, Md.) and C. Masaitis (U.S. Army, Ballistics Research Laboratory, Aberdeen Proving Ground, Md.). *IEEE Transactions on Biomedical Engineering*, vol. BME-23, Sept. 1976, p. 376-380. 24 refs.

Using a criterion of minimization of total respiratory work during a complete respiratory cycle, an expression has been derived for prediction of the inhalation time/exhalation time ratio. Comparison of calculated results to experimental data is favorable. The expression also predicts a rectangular waveshape during exercise, and this result agrees well with experimental and theoretical findings previously published. (Author)

A76-42370 # **Utilization proposals related to the area of life sciences - Status of preparatory planning (Nutzungsvorschläge aus dem Bereich Biologie/Medizin - Stand der vorbereitenden Planung).** K.-O. Pfeiffer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Bereich für Projektträgerschaften, Cologne, West Germany). *American Astronautical Society and Deutsche Gesellschaft für Luft- und Raumfahrt, International Meeting on Utilization of Space Shuttle and Spacelab, Bonn, West Germany, June 2-4, 1976, Paper.* 8 p. In German.

Space-related studies in the life sciences conducted during the last five years are reviewed, taking into account investigations of the effect of cosmic radiation on biological objects and an electrophoresis experiment. German proposals for Spacelab experiments in the life sciences are considered. The proposals are related to a study of the biological functions and an investigation of the factors of the space environment which are effective during a space flight. Specific questions which are to be studied are discussed for six research categories. G.R.

A76-42383 * # **Skylab nutritional studies.** P. C. Rambaut, M. C. Smith, Jr. (NASA, Johnson Space Center, Houston, Tex.), and C. R. Stadler (Technology, Inc., Houston, Tex.). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 14 p. 9 refs.

Precise nutritional specifications arising from both physiological and experimental requirements necessitated a comprehensive study of the chemical composition of the Skylab food supply. Each of the approximately 70 different food items was analyzed for digestible and nondigestible carbohydrate, and for protein, amino acids, fat, fatty acids, vitamins, and minerals. Menus were formulated to provide at least the National Research Council's Recommended Dietary Allowance of all essential nutrients and, in addition, to provide constant daily intakes of calcium, phosphorus, magnesium, sodium, potassium and protein. In general, the crewmembers adhered to their programmed menus. The ability to swallow and digest food was unaffected by prolonged weightlessness. Taste acuity also appeared to be undiminished inflight. The bone and muscle changes which occurred in previous flights were more pronounced in Skylab. It is concluded that these changes did not develop as a result of nutritional deficit. If such changes are nutritionally related, they point to the existence of nutritional requirements in weightlessness which differ quantitatively from those observed on earth. (Author)

A76-42384 * # **The effect of low light intensity on the maintenance of circadian synchrony in human subjects.** C. M. Winget, J. Lyman, and J. R. Beljan (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.; Wright State University, Dayton, Ohio). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 12 p. 18 refs.

Experiments were conducted on six healthy male subjects aged 20-23 yr and exposed for 21 days in a confined regulated environment to 16L:8D light:dark cycle with a view toward determining whether the light environment of 16L:8D at the relatively low light intensity of 15 ft.c. is adequate for the maintenance of circadian synchrony in man. The light intensity was 100 ft.c. during the first seven days, reduced to 15 ft.c. during the next seven days, and increased again to 100 ft.c. during the last seven days. Rectal temperature (RT) and heart rate (HR) were recorded throughout the three phases. In the 100 ft.c. regime, the RT and HR rhythms remained stable and circadian throughout. It is shown that 15 ft.c. light intensity is at or below threshold for maintaining circadian synchrony of human physiologic rhythms marked by instability and internal desynchronization with degradation of performance and well-being. S.D.

A76-42396 **Biological rhythms and endocrine function.** Edited by L. W. Hedlund, J. M. Franz (Missouri, University, Columbia, Mo.), and A. D. Kenny (Texas, University, Galveston, Tex.). New York, Plenum Press (Advances in Experimental Medicine and Biology. Volume 54), 1975. 204 p. $19.50.

The book comprises a group of papers presenting an overview of recent research on the mammalian biorhythms affecting the function of the gonads and of the pineal, adrenal, and pituitary glands. Topics include sympathetic neural control of indolamine metabolism in the rat pineal gland, the neural and hormonal bases of the reproductive cycle, and the effects of various hormones on the pituitary-adrenal axis.

C.K.D.

A76-42397 * **Biological rhythms.** F. Halberg (Minnesota, University, Minneapolis, Minn.). In: Biological rhythms and endocrine function. New York, Plenum Press, 1975, p. 1-33; Discussion, p. 33-41. 104 refs. NASA-Navy-NSF-supported research; Grants No. PHS-5-K6-GM-13891; No. PHS-1-R01-CA-14445-01.

An overview is given of basic features of biological rhythms. The classification of periodic behavior of physical and psychological characteristics as circadian, circannual, diurnal, and ultradian is discussed, and the notion of relativistic time as it applies in biology is examined. Special attention is given to circadian rhythms which are dependent on the adrenocortical cycle. The need for adequate understanding of circadian variations in the basic physiological indicators of an individual (heart rate, body temperature, systolic and diastolic blood pressure, etc.) to ensure the effectiveness of prophylactic and therapeutic measures is stressed. C.K.D.

A76-42398 * **Sympathetic neural control of indoleamine metabolism in the rat pineal gland.** H. J. Lynch, M. Hsuan, and R. J. Wurtman (MIT, Cambridge, Mass.). In: Biological rhythms and endocrine function. New York, Plenum Press, 1975, p. 93-105; Discussion, p. 106-114. 41 refs. Grants No. PHS-AM-11709; No. NGR-22-009-627.

The mechanisms responsible for the acceleration in rat pineal biosynthetic activity in response to prolonged exposure to darkness or to immobilization were investigated in animals whose pineals were surgically denervated. Some animals were adrenalectomized to remove one potential source of circulating catecholamines, and some were subjected to a partial chemical sympathectomy accomplished by a series of intravenous injections of 6-hydroxydopamine. Results suggest that N-acetyltransferase (NAT) activity can be enhanced either by release of norepinephrine from sympathetic terminals within the pineal or from sympathetic nerve terminals elsewhere. The stress of immobilization stimulates the pineal by increasing circulating catecholamines. Photic control of pineal function requires intact pineal sympathetic innervation, since the onset of darkness apparently does not cause a sufficient rise in circulating catecholamines to stimulate the pineal. The present studies suggest that nonspecific stress triggers increased biosynthesis and secretion of melatonin; it is possible that this hormone may participate in mechanisms of adaptation. C.K.D.

A76-42399 **Circadian pituitary adrenal rhythms.** D. T. Krieger (Mount Sinai School of Medicine, New York, N.Y.). In: Biological rhythms and endocrine function. New York, Plenum Press, 1975, p. 169-184; Discussion, p. 185-189. 77 refs. NSF Grant No. NB-0289397A2.

The characteristics of circadian periodicity of plasma corticosteroid levels are discussed, and experimental approaches used to study the factors underlying this periodicity in humans and animals are described. Results of investigations of the effect of neurotransmitter content, sleep-wake state, and rest-activity cycles on neural rhythmicity are reviewed. It appears that circadian adrenal corticosteroid periodicity is a reflection of central nervous system processes involved in the regulation of periodic corticotrophin-releasing factor and adrenocorticotropic hormone (ACTH) release. In humans this periodicity seems to be endogeneous, with the peaking time related to some aspects of the sleep-wake cycle but modulated by the light-dark cycle. The basis for changes in the central nervous system neurotransmitter content is unknown. C.K.D.

A76-42461 **Biogenic ice nuclei. I - Terrestrial and marine sources.** R. C. Schnell (National Center for Atmospheric Research, Boulder, Colo.) and G. Vali (Wyoming, University, Laramie, Wyo.). *Journal of the Atmospheric Sciences,* vol. 33, Aug. 1976, p. 1554-1564. 45 refs. NSF Grant No. GI-3255X.

It is argued that much of the natural ice nuclei found at the earth's surface may be of biogenic origin. Experimental evidence from many sites around the globe is discussed which shows that the abundance of natural ice nuclei has a clear correlation with climate. Some tentative values are given for the flux of nuclei from the surface to the air, and data are presented which point to regional variations in the concentrations of atmospheric ice nuclei with the

pattern of variation paralleling the availability of nuclei at the surface. The correlation between these two patterns is taken to suggest that perhaps a dominant fraction of natural atmospheric ice nuclei originates from decaying vegetation in terrestrial areas and from some component of the plankton biomass in marine environments. Alternative origins for the nuclei are briefly examined, including mineral particles, volcanic sources, and anthropogenic sources. F.G.M.

A76-42462 **Biogenic ice nuclei. II - Bacterial sources.** G. Vali, M. Christensen, R. W. Fresh, E. L. Galyan, L. R. Maki, and R. C. Schnell (Wyoming, University, Laramie, Wyo.). *Journal of the Atmospheric Sciences*, vol. 33, Aug. 1976, p. 1565-1570. 13 refs.

Transient appearance of ice nuclei active at temperatures of -2 to -5 C has been noted to accompany the natural decay of plant leaf materials. It was shown that the development of these nuclei results from the presence of a bacterium which was identified as Pseudomonas syringae. These bacteria produce highly active nuclei in a variety of growth media. Evidence points to the fact that the bacterial cells themselves are the nuclei, but that nucleating capacity is a rare and changeable property of the cells. The findings raise the possibility that bacteria may play a role in atmospheric precipitation processes. (Author)

A76-42500 # **Heliobiological associations and the effect of solar half-circulation (Geliobiologicheskie sviazi i effekt poluoborota solntsa).** L. A. Vitel's, S. A. Karazhaeva, and B. A. Ryvkin. In: General and synoptic climatology. Leningrad, Gidrometeoizdat, 1975, p. 82-91. 7 refs. In Russian.

An abrupt increase in myocardial infarction cases over a five-day period, starting with Jan. 28, 1968, was found to coincide with the appearance and evolution of an intense group of sunspots. In view of this, an attempt is made to analyze a possible association between medicobiological indices and a large group of sunspots and accompanying flares, observed in August 1972. An increase in cases of disorders in cerebral circulation and cases of leukopenia is established, along with the occurrence of secondary reactions (after 12 to 15 days). Sazonov's (1968) 'solar half-circulation effect' model is applied to the interpretation of the findings. V.P.

A76-42518 **O2 transport in the alpaca /Lama pacos/ at sea level and at 3,300 m.** A. H. Sillau, S. Cueva, A. Valenzuela, and E. Candela (Lima, Universidad Nacional, Lima, Peru). *Respiration Physiology*, vol. 27, Aug. 1976, p. 147-155. 25 refs.

An experimental study was conducted to obtain information on oxygen transport in five alpacas (Lama pacos) born and raised at about 3500 m above sea level. The animals (average body weight 40 kg) were studied at 3300 m of altitude and were then taken to an altitude of 150 m (almost sea level) where they were restudied using an identical protocol, after a stay of three months at this elevation. At sea level, four of the five animals showed an average gain in body weight of 3.8 kg while the remaining alpaca showed no change. O2/CO2 transport analysis revealed that the alpaca under conditions of chronic hypoxia presents only minor cardiorespiratory adjustments. The greater economy in oxygen tension is due to the S-shape of the oxygen-hemoglobin dissociation curve. It is suggested that the high affinity of hemoglobin for oxygen combined with tissue characteristics allows the alpaca to thrive at high altitude. S.D.

A76-42519 **Pattern of breathing during hypoxia or hypercapnia of the awake or anesthetized cat.** H. Gautier (Faculté de Médecine Saint-Antoine, Paris, France). *Respiration Physiology*, vol. 27, Aug. 1976, p. 193-206. 42 refs.

A76-42541 **Neurophysiological approach to the analysis of behavior in a species (Neirofiziologicheskii podkhod k analizu vnutrividovogo povedeniia).** Edited by P. V. Simonov. Moscow, Izdatel'stvo Nauka, 1976. 159 p. In Russian.

A collection of papers is presented dealing with results of neurophysiological investigations pertaining to the analysis of mechanisms of intraspecies behavior in humans and animals. Three major areas are discussed: instrumental conditioned reflex as a method for studying the intraspecies behavior of animals, neuropharmacological analysis of animal-social interrelationships, and conditioned-reflex approach to the problem of interpersonal relationships. Particular attention is devoted to the experimental investigation of motivation associated with interpersonal interaction. S.D.

A76-42542 # **Variation of animal-social interrelationships in an animal group as an objective indicator of electrostimulation-induced disorders in the emotional-psychic sphere (Izmenenie zoosotsial'nykh vzaimootnoshenii v gruppe zhivotnykh kak ob'ektivnyi pokazatel' vyzvannykh elektrostimuliatsiei mozga narushenii v emotsional'no-psikhicheskoi sfere).** A. V. Val'dman and M. M. Kozlovskaia. In: Neurophysiological approach to the analysis of behavior in a species. Moscow, Izdatel'stvo Nauka, 1976, p. 74-110. 21 refs. In Russian.

A76-42543 # **Conditioned reflex as a technique for studying complex forms of motivation in man (Uslovnyi refleks kak metod izucheniia slozhnykh form motivatsii u cheloveka).** M. N. Valueva. In: Neurophysiological approach to the analysis of behavior in a species. Moscow, Izdatel'stvo Nauka, 1976, p. 134-143. 14 refs. In Russian.

A conditioned-reflex approach is used to study a problem of interpersonal relationships in 60 paired subjects aged 18-30 yr subjected to a four-part experiment in which one of the paired subjects (observer) is placed in a soundproof dark room and the other subject (partner) lies in another room. The observer's threshold of oral response to a sound stimulus is first determined. Attention is focused on studying the observer's 'self-anxiety' where he is punished by electric shock whenever he fails to report the occurrence of sound, and on studying the observer's 'anxiety for another person' who is now punished by electric shock whenever the observer fails to report the occurrence of sound. Reasons for changes in the heart rate are discussed. While in the first case the appearance of emotional excitation is attributed to reaction to pain, anxiety prior to pain-inducing stimulation, and desire to avoid pain, the second case is marked by a rather complex, socially determined need that caused enhancement of auditory sensitivity. S.D.

A76-42544 # **Correlation of characteristics or perceptive activity in emotion-evoking situations of different types and some personality traits (Sootnoshenie osobennostei pertseptivnoi deiatel'nosti v emotsiogennykh situatsiiakh raznogo tipa i nekotorykh lichnostnykh kharakteristik).** I. N. Gryzlova. In: Neurophysiological approach to the analysis of behavior in a species. Moscow, Izdatel'stvo Nauka, 1976, p. 143-157. 27 refs. In Russian.

Experiments were conducted to correlate personality traits with characteristics of perceptive activity of human subjects in emotive situations involving self-anxiety and anxiety for another person. Auditory sensitivity was evaluated in terms of cardiac activity. Specific groups of personality traits were revealed which correlated with success of performance in the situations considered. These groups included like factors (emotional instability-emotional stability, 'sensitized' emotional state-dynamic stability) and differed from ane another with respect to a variety of indicators. S.D.

A76-42624 **False positive diagnostic tests and coronary angiographic findings in 105 presumably healthy males.** J. Erikssen, I. Enge, K. Forfang, and O. Storstein (Rikshospitalet, Oslo, Norway). *Circulation*, vol. 54, Sept. 1976, p. 371-376. 32 refs.

Among 2014 presumably healthy males aged 40-59 years coronary heart disease (CHD) was suggested in 115 in the presence of one or more of the following criteria: a World Health Organization questionnaire on angina pectoris positive on interview; typical angina during a near maximal bicycle exercise test; a positive exercise ECG during and/or post exercise; a Minnesota Code 1.1 on a resting ECG.

Diagnostic coronary angiography was offered to all 115 CHD-suspect cases. Six refused angiography and four others were excluded. (Author)

A76-42626 **Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings.** Canoga Park, Calif., Survival and Flight Equipment Association, 1975. 148 p. $10.00.

Papers are presented on an inflatable seat cushion system for high acceleration cockpits, interface characteristics of oxygen regulators, an advanced capability microphone for an oxygen breathing mask, and the role of personal restraints in ejection mishaps. Attention is also paid to a hand portable fire extinguisher for the AH-L Army helicopter, catapult dynamics in a high acceleration environment, parachute landing injuries, and the development testing of a portable oxygen-contaminant detector. Seat mounted oxygen regulator systems, the development of an in-flight physiological data acquisition system, and a photo-computer technique for the design and analysis of personal protective equipment are also treated. B.J.

A76-42629 **Interface characteristics of oxygen regulators.** P. J. Zalesky (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), R. D. Holden, and B. F. Hiott (USAF, Washington, D.C.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 34-36.

Several current inventory USAF oxygen regulators were evaluated with respect to performance characteristics during operation. A regulator test stand and supporting hardware were utilized to continuously monitor regulator flow, outlet pressure, and oxygen presentation during static flow, dynamic respiratory simulation, and actual human user interface. In the latter case the gas concentration and pressure properties were simultaneously measured in the mask with fast response transducers capable of responding on a breath-by-breath basis. All regulators tested demonstrated considerable variability in oxygen presentation and suction pressure developed as a function of flow demand. No clear relationship was seen to exist between static and dynamic performance and it is accordingly recommended that dynamic evaluations be required for man rating of oxygen delivery components. (Author)

A76-42630 **An advanced capability microphone for oxygen breathing mask.** A. T. Pessa (Sierra Engineering Co., Sierra Madre, Calif.) and E. Joscelyn (Instrument Systems Corp., Telephonics Div., Huntington, N.Y.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 41-44.

This paper discusses the development of a new non-lip-contact dynamic microphone designed to be externally mounted in a protective enclosure (pocket) in the oxygen mask. Discussed will be the improved safety aspects and other advantages and capabilities of the new mask microphone. General performance and acoustical parameters of the new microphone are presented and compared to the current M100/AIC Microphone System. (Author)

A76-42632 **Hypoxia - Acceptable limits and its prevention.** J. Ernsting (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 49-53. 19 refs.

An oxygen delivery system fitted to an aircraft aims at preventing in-flight hypoxia. The intensities of hypoxia which are acceptable in flight are discussed under the headings of routine flight when the pressure cabin is intact and of hypoxia associated with rapid decompression of the cabin at high altitude. Inboard leakage of air between the mask and the wearer's face is examined. Major conclusions are that the minimum concentration of oxygen in the inspired gas when the pressure cabin is intact is that required to maintain an inspired oxygen tension of 122 mm Hg and that a higher inspired oxygen concentration is required if rapid decompression is not to cause hypoxia even when 100% oxygen is delivered at the instant of decompression. Safety pressure should be used in order that the gas delivered by the regulator not be diluted by the cabin air. S.D.

A76-42633 **Air bag protection for the co-pilot/gunner in the Cobra.** T. M. Loushine (U.S. Army, Material Command, Picatinny Arsenal, Dover, N.J.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 54-57. 6 refs.

Results are presented for a study intended to determine the feasibility of designing an air bag which will prevent the gunner of a Cobra attack helicopter from contacting the sighting device during crash impact. The overall system operation of automobile air bags is discussed in terms of three subsystems referred to as crash sensor, gas source, and inflatable bag. An air bag restraint system for the Cobra helicopter works much as that for automobiles, but with several differences pertaining to the location, size, and weight of various components as well as the duration of bag inflation. It is concluded that the use of an air bag substantially reduces the extent of injury and is therefore recommended. The location and designs suggested can be used without significant weight penalty. S.D.

A76-42634 **The role of personal restraints in Navy ejecton mishaps.** E. V. Rice (U.S. Navy, Naval Safety Center, Norfork, Va.), J. A. Brady, and R. S. Van Dyke (U.S. Navy, Naval Air Test Center, Patuxent River, Md.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 58-61.

Review of ejection mishaps, injuries, and causal factors clearly indicates that the vast majority of injuries are related basically to lack of or ineffectiveness of personal restraints. Injuries attributed to improper body position, seat slap, ejection force, and buffeting (to mention a few) point to lack of restraint of those body parts affected and ineffective personal equipment restraints. Furthermore, it is known that some ejections occurred only because lack of or failure of personal restraints rendered the pilot incapable of overcoming a control problem in the aircraft, leaving him no choice but to eject. This paper analyzes the role of all personal restraints in ejection episodes and injuries for the period 1969-1974, and discusses those areas where the need for design improvements is indicated. In addition, the case for improved negative-G restraints as a deterrent to loss of aircraft control and to many of the injuries commonly sustained during ejection is presented. (Author)

A76-42636 **Catapult dynamics in an environment of high acceleration.** A. M. Higgins (USAF, Vehicle Equipment Div., Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 67-71. 6 refs.

An analytical investigation of the dynamics of an ejection seat catapult under various levels of acceleration loading has been completed. A mathematical model of a current catapult design was developed and calculations of catapult dynamics at ambient temperature were carried out by digital computer. The sensitivity of various catapult performance parameters to impressed acceleration fields are

shown and the effect of seat back angle on the estimated probability of spinal injury to the combination of catapult load and acceleration field is discussed. Conclusions are drawn concerning crew ejection while in a high acceleration environment. (Author)

A76-42638 **A study of parachute landing injuries and their relationship to parachute performance and landing conditions.** R. A. Madson (USAF, 6570th Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 77-80.

Injuries sustained during operational use of the parachute by USAF crewmembers under noncombat conditions during the period Jan. 1, 1971 and Dec. 31, 1974 were analyzed to achieve a better understanding of the influence of parachute performance, landing conditions, and parachute landing training on the incidence of parachute landing injuries. Specific objectives were: (1) to categorize the type, severity and frequency of injuries resulting from parachute landing; (2) to study the relationships between landing injuries, parachute performance parameters, landing conditions and human factors; and (3) to recommend corrective actions. Injury types were correlated with parachute size, oscillation, descent rate, use of the 4-line cut, wind velocity at landing, direction of impact, terrain features, and crewmember training, age, height and weight. Results indicate that parachute landing injuries can be significantly reduced by making changes in parachute descent rates and parachute landing techniques. (Author)

A76-42639 **Breathing costs, lifejacket inflation and parachute harnesses.** R. A. Jordan (Aerospace Engineering Test Establishment, Medley, Alberta, Canada). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 83-86. 10 refs.

A study was conducted to investigate the amount of increase in energy required to compensate for the restriction to breathing caused by inflating a lifejacket beneath a parachute harness. Fifteen subjects were tested under conditions of no lifejacket inflation and then lifejacker inflation. Each subject was his own statistical control. Energy cost was measured by oxygen consumption. Subsequent analysis of the oxygen consumption data found a significant increase in the energy cost of breathing with a lifejacket inflated beneath a parachute harness. (Author)

A76-42640 **Environmental testing of commercial automatic inflators.** J. Z. Lewyckyj (U.S. Navy, Crew Systems Dept., Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 87-90.

The results of a six month environmental test program to evaluate six commercial automatic (water-activated) CO2 inflators are presented. The devices tested include the Bernhardt-Apparatebau SECUMAR BS 8, Conax Corp. 1812-16-51, International Latex Corp. WAID II, Jay-El Products Inc. 50265 and 50292, and H. Koch and Sons LPU-9/P. Paper, pill, and battery-squib operated trigger systems were represented. All inflators tested had manual override, which was established as a necessary redundancy in this equipment. The devices were subjected to humidity, low temperature, rain, high temperature, vibration and impact tests, and the breaking strength of the lanyard was established. The performance of individual units is reported, and modifications required to meet environmental test standards in the case of failure are described. C.K.D.

A76-42641 **An inflight monitor for aircraft cockpit/cabin environments.** G. R. James, A. O. Bergquist, and D. D. White (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 91-94.

The paper describes the design and capabilities of a modular miniature environmental monitor (MEM) devised to examine the cockpit/cabin environment of most Air Force aircraft in current use. The instrument may be operated with units assembled in the aluminum case, in seat cushions, or separated by umbilical cables for remote placement in confined spaces. A self-contained power supply is included in any of these configurations, and the instrument batteries are capable of 8 to 10 hr continuous operation. MEM is capable of real-time recording of four environmental parameters: wind velocity, dew point, ambient air temperature, and either cabin pressure or black globe temperature. A companion reproducer unit provides four channels of strip chart drive output from a recorded tape cassette. Results are presented for a chamber-simulated aircraft flight and a pilot training aircraft environmental test flight. Measurement of pertinent parameters with the MEM in conjunction with monitoring of physiological parameters will provide the data necessary to establish an envelope of environmental conditions in order to yield optimal pilot/aircraft performance. S.D.

A76-42642 **Portable oxygen-contaminant detector - Development test and evaluation.** K. G. Ikels (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) and W. L. Crow (USAF, Washington, D.C.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 95-97.

A portable oxygen-contaminant analyzer developed by the USAF School of Aerospace Medicine underwent an extensive 3-month field test and evaluation at four participating bases. Oxygen was sampled from aircraft, LOX service carts and bulk storage tanks, and reference samples. The field-test managers unanimously recommended that the analyzer development continue with an Operational Test and Evaluation program. (Author)

A76-42643 **Seat mounted oxygen regulator systems.** J. Ernsting (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 98-101.

The oxygen system of a high-performance interceptor/strike aircraft should provide gas to the respiratory tract on demand with minimal impedance to breathing and ensure dilution of the oxygen with cabin air which is varied automatically with cabin altitude. A review of the requirements for and design of oxygen delivery systems in the United Kingdom leads to the conclusion that the most desirable mounting site for the main oxygen regulator is the side of the seat pan of the ejection seat. A seat-mounted regulator assembly is fitted to two new RAF aircraft. The main features of this seat-mounted assembly are considered, and it is shown that the system provides true redundancy of essential components and allows very simple emergency crew drills. A seat mounted assembly employing a premix air dilution unit is described. Future improvements are expected to include a more accurate and controlled method of diluting oxygen with air in order to improve oxygen economy. S.D.

A76-42644 **Development of an in-flight physiological data acquisition system.** T. R. Morgan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 102-104.

An in-flight physiological data acquisition system capable of recording selected biomedical and environmental parameters of flight has recently completed final development. The system employs an

instrumented oxygen mask which inputs to signal processing and recorder packages positioned in conveniently accessible cockpit areas, or in available pockets of the crewmenber's survival vest. These subunits are of sufficiently flexible configuration to be fully compatible with the broad spectrum of military cockpits, and are capable of monitoring a variety of parameters. These include accessible lung volumes (such as tidal volume, minute volume and forced vital capacity), together with oxygen consumption, ECG activity, G(z), cabin pressure, and internally generated time code signal, and voice communications. Information obtained is recorded on cassette tape for subsequent retrieval and analysis by ground-based data reduction equipment. The system's employment in representative operational flying roles is expected to prove useful in both the establishment of breathing system design criteria, and assessment of the biomedical stresses of flight. (Author)

A76-42645 **A photo-computer technique for design and analysis of personal protective equipment.** A. L. Lastnik and C. W. Gordon (U.S. Army, Clothing, Equipment and Materials Engineering Laboratory, Natick, Mass.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 13th, San Antonio, Tex., September 21-26, 1975, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 109-112. 8 refs.

Combined use of multi-exposure photography and computer analysis provides a reliable technique for measuring a target area perceived by a ballistic fragment array. Perceived area is a parameter necessary for casualty reduction analysis of body armor and headgear. The Photo-Computer analysis procedure may be applied to design analysis of clothing and headgear. Design discrepancies can be defined, visualized and corrected through analysis of the photographs and data matrix. The data matrix can be represented by a series of polynomials or equations. Other applications of the Photo-Computer techniques include determination of helmet off-set, fit of clothing, comparison of two or more helmets, component interface and development of contour drawings. (Author)

A76-42799 **Energetics of isometric exercise in man.** P. Cerretelli, A. Veicsteinas, M. Fumagalli, and L. Dell'Orto (Milano, Università, Milan, Italy). *Journal of Applied Physiology*, vol. 41, Aug. 1976, p. 136-141. 29 refs. Consiglio Nazionale delle Ricerche Grant No. 73,00200,11,115,4830.

The role of aerobic and anaerobic energy sources during sustained and intermittent isometric contractions of different muscle groups was investigated, and the extent of blood flow impairment in the limb muscles during isometric contractions was studied. Results indicate that the contribution of both alactic and lactic acid anaerobic mechanisms in isometric exercise is significant even at low tension levels. Exhaustion seems to occur when the maximal glycolytic capacity of the muscles involved is attained and when high energy phosphate stores have been expended. Circulatory impairment occurs when an isometric contraction is sustained. However, intermittent activity can be maintained for long periods if proper recovery time is allowed. In these conditions only the alactic oxygen debt accumulates and glycolysis does not occur. C.K.D.

A76-42800 **Respiratory, circulatory, and ECG changes during acute exposure to high altitude.** P. Laciga and E. A. Koller (Zürich, Universität, Zurich, Switzerland). *Journal of Applied Physiology*, vol. 41, Aug. 1976, p. 159-167. 37 refs.

Quantitative electrocardiographic and accessory circulatory and respiratory mass spectrographic studies were carried out on 30 young, healthy subjects at rest during moderately acute, standardized stepwise exposure to simulated altitude up to 7000 m. The ECG (Einthoven and Wilson leads) and the respiratory gases were recorded synchronously during ascent and descent. The extensive data assembled, summarized in six tables and illustrated in seven graphs, represent the basis for future investigations on the single factors which underlie hypoxia-induced ECG changes during exposure to high altitude. (Author)

A76-42847 **Prevention of heart disease in healthy pilots.** W. Somerville (Middlesex Hospital, London; Harefield Hospital, Middx., England). *Journal of Air Traffic Control*, vol. 18, July-Sept. 1976, p. 16-19.

Primary prevention of heart disease among healthy commercial air pilots is examined. Such risk indicators as blood pressure, smoking, obesity, exercise, blood lipids, stress, electrocardiography, and the exercise stress test are discussed. B.J.

A76-42879 # **The Air Force takes to the ground.** T. L. Balven (USAF, New Business Div., Wright-Patterson AFB, Ohio). *Astronautics and Aeronautics*, vol. 14, Sept. 1976, p. 52-57.

The state-of-the-art of military aircraft training simulator technology is reviewed, and areas of current research and development are identified. Both night-only and day/night approaches are discussed. Simulation of motion and force is described. It is argued that due to the high costs of advanced synthetic training facilities, development work should be based on careful analyses of the sophistication of displays and sensor simulation required for successful accomplishment of individual training tasks to avoid the development of systems with superfluous fidelity and complexity. C.K.D.

A76-42906 **The design-induced part of the human error problem in aviation.** C. O. Miller (Safety System, Inc.). *Journal of Air Law and Commerce*, vol. 42, Winter 1976, p. 119-131. 15 refs.

To account for accident-producing pilot's errors and to find the ways to minimize them, an overview is given of approaches to human error categorization and interpretation, including the mistake approach, the task-overload approach, the convenient cubbyhole concept and the accident prevention viewpoint. Errors induced by the aircraft and system design (the system encompassing pilot, controller, vehicle, airport and weather conditions, etc) are emphasized. Recent studies in the pilot error field based on behavioristic models of the man-machine interaction are discussed along with the techniques for avoiding design-induced pilot errors. S.N.

A76-42961 * **Continuously variable amplitude contrast microscopy for the detection and study of microorganisms in soil.** L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Applied and Environmental Microbiology*, vol. 31, Apr. 1976, p. 605-608. 30 refs. Grant No. NGR-39-009-180.

A76-42962 * **Colonization of soil by Arthrobacter and Pseudomonas under varying conditions of water and nutrient availability as studied by plate counts and transmission electron microscopy.** D. P. Labeda, K.-C. Liu, and L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Applied and Environmental Microbiology*, vol. 31, Apr. 1976, p. 551-561. 28 refs. Grant No. NGR-39-009-180.

A76-42971 * **New horizons for study of the cardiopulmonary and circulatory systems.** E. H. Wood (Mayo Foundation; Minnesota, University, Rochester, Minn.). *Chest*, vol. 69, Mar. 1976, p. 394-408. 69 refs. Research supported by the American Heart Association; Grants No. NIH-HL-04664; No. NIH-RR-7; No. NGR-24-003-001; Contract No. F44620-71-C-0069.

The paper discusses the development of computer-controlled three-dimensional reconstruction techniques designed to determine the dynamic changes in the true shape and dimensions of the epi- and endocardial surfaces of the heart, along with variable time base (stop-action to real-time) displays of the transmural distribution of the coronary microcirculation and the three-dimensional anatomy of the macrovasculature in all regions of the body throughout individual cardiac and/or respiratory cycles. A technique for reconstructing a cross section of the heart from multiplanar videoroentgenograms is outlined. The capability of high spatial and high temporal resolution scanning videodensitometry makes possible measurement of the appearance, mean transit and clearance of roentgen opaque sub-

stances in three-dimensional space through the myocardium with a degree of simultaneous anatomic and temporal resolution not obtainable by current isotope techniques. The distribution of a variety of selected chemical elements or biologic materials within a body portion can also be determined. S.D.

A76-42972 * **Altered phospholipid metabolism in a temperature-sensitive mutant of a thermophilic bacillus.** L. L. Kostiw and K. A. Souza (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Archives of Microbiology*, vol. 107, 1976, p. 49-55. 30 refs.

A76-42975 * **Microbiology on Mars.** H. P. Klein (NASA, Ames Research Center, Office of Life Sciences, Moffett Field, Calif.). *ASM News*, vol. 42, no. 4, 1976, p. 207-214.

After a brief discussion of Mars properties (temperature, radiation, gravity, magnetic field, soil composition, water and nitrogen availability) and their implications for biology, several Viking Lander experiments concerning microbiological study are described. The Pyrolytic Release (or carbon assimilation) experiment is designed to measure either photosynthetic or chemosynthetic fixation of CO2 or CO into organic compounds. The Labeled Release experiment is designed to test for metabolic activity during incubation of a surface sample that has been moistened with a dilute aqueous solution of C-14 labeled simple organic compounds (formate, glycine, lactate, alanine). The Gas Exchange experiment involves gas chromatography of surface samples in two modes: the humid mode in which samples will be incubated in the presence of CO2 and water vapor, and the heterotrophic mode which assumes the presence of frankly heterotrophic organisms in the Mars surface. B.J.

A76-43358 **Effect of background constraint on visual search times.** B. Brown (Nottingham University, Nottingham, England). *Ergonomics*, vol. 19, July 1976, p. 441-449. 19 refs. Science Research Council Grant No. B/SR/8278.

In experiments devised to study the effects of background constraint on visual search times, statistically determined displays differing in the probability of transition from the state 'dot present' to 'dot absent' were used as search backgrounds and the relation between search time and the probability of transition was determined. It is shown that background constraint changes have a large effect on search time, and it is suggested that the concept of probability of transition may be useful in describing applied search task backgrounds. B.J.

A76-43359 **The effect of memory load on the circadian variation in performance efficiency under a rapidly rotating shift system.** S. Folkard, P. Knauth, T. H. Monk (Medical Research Council, Laboratory of Experimental Psychology, Brighton, England), and J. Rutenfranz (Dortmund, Universitat, Dortmund, West Germany). *Ergonomics*, vol. 19, July 1976, p. 479-488. 21 refs.

A76-43372 **Biometeorology: Study of thermal changes of man in the outdoors - Application to the case of a cold environment (Biométéorologie: Etude des échanges thermiques de l'homme en plein air - Application au cas d'un environnement froid).** E. Choisnel (Météorologie Nationale, Paris, France). *La Météorologie*, June 1976, p. 85-106. 20 refs. In French.

Basic physical principles are applied in constructing a model of thermal changes in a clothed man under general meteorological conditions. The fundamental notions considered are heat exchange and maintenance of thermal balance. Minimum clothing insulation for combinations of meteorological parameters of wind, temperature, and irradiation are calculated by the model. P.T.H.

A76-43451 * # **Body size and chronic acceleration.** G. C. Pitts (Virginia University, Charlottesville, Va.). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 13 p. 13 refs. Grant No. NGR-47-005-213.

Experiments were conducted to study body composition as a function of acceleration (1-4.7 G) in mice and rats. It is shown that fat-free body mass is a predictable function of acceleration, and that of nine components of the fat-free body mass only skeletal muscle, liver and heart contributed to observed changes induced by delta G. Fat-free body mass was found to pass through a maximum at 1 G when it was plotted vs G for mice, rats and monkeys (1-4.7 G) and men (0-1 G). B.J.

A76-43458 * # **Possible nutrients and energy sources available to contaminating terrestrial organisms on Jupiter.** S. Chang and R. D. MacElroy (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 12 p. 21 refs.

Data from recent observations of Jupiter, laboratory simulations of atmospheric chemistry, and theoretical atmospheric model studies are utilized to construct a distribution of possible nutrients and energy fluxes in regions of Jupiter's atmosphere delimited by the temperature range 273-373 K. Additional constraints on the residence time of nutrients and organisms in hospitable regions of the atmosphere are set by atmospheric circulation models. In the absence of concentrating mechanisms these elements and compounds necessary to support life cannot exist in sufficient abundance to support metabolism or to allow cell division. Conclusion is that contamination of the Jovian atmosphere by terrestrial organisms is extremely unlikely. (Author)

A76-43700 **Limitations of the computer in electrocardiographic interpretation.** C. A. Caceres (Maryland, University, College Park, Md.; Clinical Systems Associates, Inc., Washington, D.C.). *American Journal of Cardiology*, vol. 38, Sept. 1976, p. 362-376. 123 refs.

Awareness of the limits of computer performance allows a physician to make adequate use of the computer in current electrocardiographic practice. The discussion covers the characteristics of available computer programs, with special emphasis on the MSDL (Medical Systems Development Laboratory) system and the Mount-Sinai-IBM-Cro-Med Bionics program and system. Computer evaluation of arrhythmias is discussed along with computer electrocardiography in stress testing. Also discussed are comparison programs and cardiac pacemaker analysis systems. Limitations of computer electrocardiography are essentially a result of the lack of objectivity in clinical electrocardiographic criteria for both measurement and diagnosis. S.D.

A76-43763 **Hyperlipidemia and atherosclerosis.** R. Ross and L. Harker (Washington, University, Seattle, Wash.). *Science*, vol. 193, Sept. 17, 1976, p. 1094-1100. 46 refs. Grants No. NIH-HL-14823; No. NIH-HL-14860; No. NIH-HL-11775.

Experimental evidence is presented to provide new insight into the complex mechanisms whereby hyperlipidemia causes progressive atherosclerosis. Chronic hyperlipidemia is shown to initiate and maintain lesions by endothelial cell desquamation and lipid accumulation. Physical injury to the endothelial lining of arteries sets off a process which probably is an attempt at healing the injury but which can lead to atherosclerosis. Chemical agents such as hemocystine can produce a similar series of events that result in atherosclerosis. These events include focal loss of endothelium, exposure of subendothelial connective tissue, and adherence of platelets followed by release of factors that stimulate intimal smooth muscle proliferation. S.D.

A76-43766 * **Behavioral fever in newborn rabbits.** E. Satinoff, G. N. McEwen, Jr., and B. A. Williams (NASA, Ames Research Center, Environmental Control Research Branch, Moffett Field,

Calif.). *Science*, vol. 193, Sept. 17, 1976, p. 1139, 1140. 10 refs. Grant No. PHS-NS-12033.

New Zealand white rabbit pups aged 12 to 72 hr were divided into three groups and given an intraperitoneal injection of Pseudomonas polysaccharide, a saline vehicle alone, and no treatment, respectively. The animals injected with pyrogen and maintained at an ambient temperature of 32 C for 2 hr did not develop fever. When placed in a thermally graded alleyway, the animals injected with pyrogen selected gradient positions that represented significantly higher temperatures than controls injected with saline. Further stay at selected positions for 5 min caused a considerable increase in the rectal temperature of the pyrogen-injected pups but not that of controls. The results support the hypothesis that newborn rabbits will develop a fever by behavioral means after a single injection of an exogenous pyrogen if the opportunity for thermoregulatory behavior is present. No fever develops if the pups must rely solely on internal thermoregulatory mechanisms. The behavioral system for producing a fever is mature at birth, but an adequate system of internal reflexes does not appear to develop for some days. S.D.

A76-43841 # **Change in the protein composition of rat brain and liver chromatin during functional reconstruction of cells - The effect of adaptation to hypoxia (Izmenenie belkovogo sostava khromatinov mozga i pecheni krys pri funktsional'noi perestroike kletov - Vliianie adaptatsii k gipoksii).** I. P. Ashmarin, V. G. Konarev, V. V. Sidorova, L. N. Simanovskii, and N. A. Fedorova (Leningradskii Gosudarstvennyi Universitet; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Rastenievodstva; Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 228, May 1, 1976, p. 222-224. 9 refs. In Russian.

A76-43875 **Vernier offset produced by rotary target motion.** L. Matin, K. R. Boff (Columbia University, New York, N.Y.), and J. Pola (New York, State University, New York, N.Y.). *Perception and Psychophysics*, vol. 20, no. 2, Aug. 1976, p. 138-142. 9 refs. NSF Grant No. BMS-73-01463; Grant No. NIH-EY-00375.

Two separated collinear lines appear displaced from collinearity when either the target or the subject's head is rotated in a frontal plane. The direction of perceived offset is reversed for opposite directions of rotation. The present experiments prove that the effect depends on some property of the visual system that is responsive to stimulus motion per se and is not manifested in the response to stationary targets. Two mechanisms which may be responsible for the rotation-contingent effect are considered: (1) an induction mechanism based on the dynamics of induced tilt or of figural after-effect displacement, (2) a mechanism based on variation of visual latency with stimulus energy/time. (Author)

A76-43881 **Numerical analysis of the dynamic behaviour for the human spine.** T. Tamaki and E. Umezaki (Nippon Institute of Technology, Saitama, Japan). In: Japan National Congress for Applied Mechanics, 24th, Tokyo, Japan, November 12, 13, 1974, Proceedings. Tokyo, University of Tokyo Press, 1976, p. 49-77. 11 refs.

This paper investigates the forces exerted at each part of the vertebral column when the finite external displacements are given at some vertebrae. The vertebral column is treated as a three-dimensional collection of rigid bodies interconnected by deformable elements, and the nonlinear analysis which is the incremental stiffness method in the finite element method was done. (Author)

A76-44040 **Detection of quantum flux modulation by single photopigments in human observers.** T. P. Piantanida, T. A. Bruch, M. Latch, and F. D. Varner (Florida State University, Tallahassee, Fla.). *Vision Research*, vol. 16, no. 10, 1976, p. 1029-1034. 35 refs. Grant No. NIH-5-R01-EY-00684.

A modified exchange threshold technique was used to measure the action spectra of single cone photopigments of trichromatic human observers. The quantum flux of two superimposed 2 degree fields - 540 and 640 nm - was adjusted to the inverse ratio of the sensitivity of either chlorolabe or erytholabe, so that one of the photopigments made a constant quantum catch. The lights for the two wavelengths were flickered sinusoidally in counterphase above the flicker fusion frequency of the blue cones. At any wavelength between 410 and 690 nm, the log of the reciprocal of the number of quanta required to extinguish the flicker of the 540/540 nm field described the log sensitivity at that wavelength of the only photopigment capable of detecting the flicker. B.J.

A76-44041 **Temporal determinants of the form of the spatial contrast threshold MTF.** L. E. Arend, Jr. (Brandeis University, Waltham, Mass.). *Vision Research*, vol. 16, no. 10, 1976, p. 1035-1042. 46 refs. NSF Grant No. GB-24100X.

Much of the apparent variation of sensitivity of narrowly-tuned psychophysical channels indicated by the shape of the spatial MTF for continuously-presented gratings can be accounted for by temporal mechanisms common to all the channels. The model presented here implies that the channels detecting at low spatial frequencies are equal in peak sensitivity. The predictions of the model are supported by previous experiments involving temporally modulated spatial gratings. As the model predicts, sensitivity to low-spatial-frequency gratings was enhanced by tracking a target spot moving across the display while sensitivity to high-spatial-frequency gratings was reduced. (Author)

A76-44042 **Gradient detection and contrast transfer by the human eye.** G. J. van der Wildt, C. J. Keemink, and G. van den Brink (Erasmus Universiteit, Rotterdam, Netherlands). *Vision Research*, vol. 16, no. 10, 1976, p. 1047-1053. 12 refs.

Threshold measurements were performed with stimulus patterns involving gradual changes in luminance. The results of these measurements indicate that threshold data obtained using linear luminance gradients permit quantitative prediction of the dependence of the threshold modulation on the spatial frequency as well as on the number of cycles of sinusoidal gratings. It appears that for detection purposes, a sinusoidal grating can be considered as one linear gradient with the same width. This makes it possible to predict the spatial modulation transfer function of the eye from measurements with spatial luminance gradients. (Author)

A76-44043 **An experimental study of geometric properties of the visual space.** V. I. Musatov (Moskovskii Inzhenerno-Fizicheskii Institut, Moscow, USSR). *Vision Research*, vol. 16, no. 10, 1976, p. 1061-1069. 15 refs.

The results of experiments investigating the shapes of the physical loci of geodesics and equidistant horopters in the binocular visual space, the effect of the light-points' size upon the construction of these curves, and equipartitioning visual segments and constructing segments equal to a reference standard are reported. The comparison of visual geodesics with the corresponding equidistants leads to the conclusion that, for many of the observers, the binocular visual space is a space of constant or only slightly variable negative curvature, i.e. this space is hyperbolic. The increase of the light-points' size does affect the construction of visual geodesics and equidistants, being most manifest in the construction of the former. Equipartitioning visual segments and constructing visual segments equal to a standard reference segment is dependent on the locus of the standard segment with regard to the egocenter and the central median axis. (Author)

A76-44044 **Size specificity and interocular suppression - Monocular evoked potentials and reaction times.** M. R. Harter, V. L. Towle, and M. F. Musso (North Carolina, University, Greensboro, N.C.). *Vision Research*, vol. 16, no. 10, 1976, p. 1111-1117. 41 refs. Research supported by the University of North Carolina.

Nine adults from 22 to 34 years of age were tested for changes in visual evoked potentials and reaction time to checkerboards flashed to the left eye. These changes were studied as a function of the size of the checks (ranging from 9 to 95 minutes of arc) in

checkerboards continuously viewed by the right eye. The results showed that continuous stimulation of one eye suppressed visual evoked potential amplitude in response to flashing in the other eye. This fact supports the hypothesis that there are size-specific channels in the visual system and that monocular channels of similar size specificity, which originate from the two eyes, interact centrally.
B.J.

A76-44045 **The amacrine cell.** R. Y. Chan and K.-I. Naka (California Institute of Technology, Pasadena, Calif.). *Vision Research*, vol. 16, no. 10, 1976, p. 1119-1129. 27 refs. Grants No. PHS-NS-10628; No. PHS-NB-19234; No. PHS-EY-00898.

Catfish retinal neurons in the proximal layers are classified into three arbitrary types: the sustained, the transient and the ganglion (spiking) cells, studies on receptive fields formed by catfish ganglion cells and the stimulation of ganglion cells by extrinsic polarization of interneurons are presented. It is concluded that the sustained retinal neurons are geniune amacrine cells for the following reasons: (1) they lack axons, (2) a majority of them correspond morphologically to Cajal's amacrine cells (1972), (3) they produce sustained slow potentials without any spike activity, and (4) they communicate with both the type A (on-center) and type B (off-center) ganglion cells.
B.J.

A76-44046 **The unresponsive regions of visual cortical receptive fields.** L. Maffei and A. Fiorentini (CNR, Laboratorio di Neurofisiologia, Pisa, Italy). *Vision Research*, vol. 16, no. 10, 1976, p. 1131-1139. 18 refs.

Simple and complex cells in area 17 of the cat cortex have been recorded. Around the classical receptive field (regions within which a moving or flashing bar can elicit a response from a cell) there are large regions which dramatically influence the cell's responsiveness. In some cells these regions are facilitatory, in other, inhibitory. Since these regions do not respond in isolation to moving or flashing bars, they have been called unresponsive regions of the receptive field. Both the inhibitory and facilitatory unresponsive regions show spatial-frequency selectivity. All the facilitatory unresponsive regions show orientation selectivity, while most of the inhibitory unresponsive regions are not orientation selective. Both the facilitatory and the inhibitory unresponsive regions contribute to the size-selectivity of the cell. The facilitatory unresponsive regions show a great influence on the orientation selectivity of the cell, in that they sharpen the orientation channel of the cell. The inhibitory unresponsive regions, on the contrary, do not have such an effect.
(Author)

A76-44047 **Functional dependence of optical parameters on circumferential forces in the cat lens.** H. R. Sunderland and W. D. O'Neill (Illinois, University, Chicago, Ill.). *Vision Research*, vol. 16, no. 10, 1976, p. 1151-1158. 12 refs. Grant No. NIH-GM-01436.

A76-44048 **Saccadic suppression of image displacement.** L. Stark, R. Kong, S. Schwartz, D. Hendry (California, University, Berkeley, Calif.), and B. Bridgeman (California, University, Santa Cruz, Calif.). *Vision Research*, vol. 16, no. 10, 1976, p. 1185-1187. 25 refs.

Experiments were conducted in which subjects viewed the stimulus target binocularly and were instructed to perform horizontal saccadic eye movements from one vertical border of the target to the other. The stimulus was displaced at unpredictable times to the left or right in the first set of experiments (collinear) and up or down in the second set (orthogonal). Results showed that collinear and orthogonal image displacements undergo quantitatively similar raising of thresholds with saccades, which means that a saccadic suppression of displacement is a quantitative but non-vectorial effect following the vectorial Helmholtzian comparator.
B.J.

A76-44167 # **Dynamics of sleep patterns during prolonged simulated hypogravics.** H. Saiki and M. Nakaya (Tokyo, University, Tokyo, Japan). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 8 p. 8 refs.

A six-day thermal neutral water immersion experiment was performed on three healthy male adults with the subjects in a headout supine position to investigate the characteristics of sleep patterns under reduced gravity conditions. Electroencephalographic and electrooculographic investigations of sleep patterns showed the following major results: (1) general cycles of sleep patterns varied significantly in terms of total sleep time and the duration of each sleep stage, and (2) a clear adaptive tendency was observed in the sleep characteristics.
B.J.

A76-44538 # **Short-term and long term memory - Validity of division and organization in time (Kratkovremennaia i dolgovremennaia pamiat' - Pravomochnost' razdeleniia i organizatsiia vo vremeni).** V. B. Grechin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 1, Nov.-Dec. 1975, p. 982-992. 95 refs. In Russian.

The paper presents available psychological, neuropsychological, and neurophysiological evidence on the differences in the properties of short- and long-term memory in higher animals and in man. Current hypotheses on the neurophysiological foundation of the process of forgetting are reviewed. Data obtained from studies on patients with long-range intracerebral electrodes allow agreement with the concept of the dual nature of the mechanisms responsible for human memory along with a parallel realization of short-term and long-term memory.
S.D.

A76-44539 # **The skin galvanic response as an indicator of changes in psychic state (Kozhno-gal'vanicheskii refleks kak pokazatel' izmenenii psikhicheskogo sostoianiia).** T. I. Grekova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 1, Nov.-Dec. 1975, p. 993-998. 47 refs. In Russian.

The paper presents a review of data on the galvanic skin response (GSR), its nature, and relation to orientating response. It is shown that GSR accompanies all psychic processes, including perception, attention, thinking, emotions, but only while they require an increased stress or enhanced activity. A discussion of the possibility of employing GSR as an indicator of any change in psychic state suggests that slow electric processes (SEP) in the human brain and GSR share a common basis in that GSR appears to be the noise-associated and integrated reflection of the same cerebral dynamics whose local central manifestation is represented by SEP patterns.
S.D.

A76-44540 # **General regularities in the adaptation of man to high-altitude climate (Ob obshchikh zakonomernostiakh prisposobleniia cheloveka k vysokogornumu klimatu).** M. M. Mirrakhimov (Kirgizskii Meditsinskii Institut, Frunze, Kirgiz SSR). *Fiziologiia Cheloveka*, vol. 1, Nov.-Dec. 1975, p. 1018-1026. 37 refs. In Russian.

The paper analyzes the course of human adaptation to high-mountain conditions along with its different phases. Particular attention is given to the characteristics of repeated adaptation to a high-altitude climate and to the stability and pronouncedness of adaptive changes in the human organism after returning to normal heights. Individual features observed in the general regularities underlying the adaptive process are discussed. Of some interest are the classification of high-altitude human pathology as well as the mechanisms responsible for the occurrence of various syndromes of disadaptation.
S.D.

A76-44541 # **Reflection of the characteristics of an awake man's cerebral bioelectric activity in sleep EEG (Otrazhenie osobennostei bioelektricheskoi aktivnosti mozga bodrstvuiushchego cheloveka v EEG sna).** V. B. Malkin, L. P. Latash, and A. K. Kochetov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 1, Nov.-Dec. 1975, p. 1027-1031. 19 refs. In Russian.

A76-44542 # **Humoral-hormonal mechanisms of adaptation of the human organism to athletic activity (Gumoral'no-gormonal'nye mekhanizmy adaptatsii organizma k sportivnoi deiatel'nosti).** G. N. Kassil' (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 1, Nov.-Dec. 1975, p. 1032-1047. 56 refs. In Russian.

The blood and urine of highly qualified athletes (swimmers, runners, wrestlers, cyclists, skiers, decathlon competitors, etc.) are analyzed for biologically active substances of the ergo- and trophotropic series such as metabolites, hormones, and mediators. An examination of relevant published data indicates that the sympathoadrenal and hypothalamus-hypophysics-adrenal systems represent the key humoral–hormonal mechanisms during enhancement of working capacity and adaptation of the human organism to athletic activity. The trophotropic systems begin to dominate as fatigue and exhaustion develop. In the stage of adaptation, the level of biologically active substances in the blood and their excretion through the urine is somewhat decreased. Factors causing an increase in the efficiency of the human organism are identified. S.D.

A76-44575 * **Compensatory adrenal growth - A neurally mediated reflex.** M. F. Dallman, W. C. Engeland, and J. Shinsako (California, University, San Francisco, Calif.). *American Journal of Physiology*, vol. 231, Aug. 1976, p. 408-414. 19 refs. Research supported by the University of California; Grants No. PHS-AM-06704; No. PHS-GM-00927; Contract No. NCAR-665-446.

The responses of young rats to left adrenalectomy or left adrenal manipulation were compared to surgical sham adrenalectomy in which adrenals were observed but not touched. At 12 h right adrenal wet weight, dry weight, DNA, RNA, and protein content were increased (P less than 0.05) after the first two operations. Left adrenal manipulation resulted in increased right adrenal weight at 12 h but no change in left adrenal weight. Sequential manipulation of the left adrenal at time 0 and the right adrenal at 12 h resulted in an enlarged right adrenal at 12 h (P less than 0.01), and an enlarged left adrenal at 24 h (P less than 0.05), showing that the manipulated gland was capable of response. Bilateral adrenal manipulation of the adrenal glands resulted in bilateral enlargement of 12 h (P less than 0.01). Taken together with previous results, these findings strongly suggest that compensatory adrenal growth is a neurally mediated reflex. (Author)

A76-44592 # **Auditory and physiological effects of infrasound.** D. L. Johnson (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). In: Inter-noise 75; Proceedings of the International Conference on Noise Control Engineering, Sendai, Japan, August 27-29, 1975.
Sendai, Japan, Tohoku University, 1975, p. 475-482. 21 refs. Research sponsored by the U.S. Environmental Protection Agency and U.S. Air Force.

Infrasound is defined as acoustic energy which has a frequency ranging between 0.1 and 20 Hz. The most common misconception about infrasound is that it cannot be heard. A glance at the results of various investigators indicates that infrasound can be heard, at least down to 1 Hz. The study deals with auditory and physiological effects of infrasound, along with its relation to vibration and annoyance as a detrimental burden on the human organism. A major conclusion is that it is not the infrasound that causes problems such as annoyance, chest vibration, etc., but audible frequencies above 20 Hz that are present in the noise. The only clear damage that has so far been observed due to infrasound is the perforation of the chinchilla eardrums and the scarring of engine room personnel of submarines. It seems that the middle ear is the most susceptible part of the body and that the physiological tolerance limit to infrasound is probably determined by the middle ear. S.D.

A76-44715 # **Mechanical activity of the papillary muscles in the heart of a rat under high-altitude conditions (Mekhanicheskaia attivnost' papilliarnykh myshts serdtsa krys v usloviiakh vysokogor'ia).** S. B. Daniiarov, A. Kh. Karasaeva, and T. N. Naumova (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 62, June 1976, p. 906-911. 31 refs. In Russian.

Experiments were conducted to study the influence of continuous high-mountain hypoxia on the mechanical activity of isolated papillary muscles in the left ventricle of rats. The principal indicators considered include the force parameters such as maximum developed tension, contraction intensity, work and power of the muscles at different times of high-altitude adaptation (3rd, 15th, 30th, and 40th days). It is shown that beginning from the 15th day of stay at a high altitude the results indicate a statistically significant increase in the maximum developed tension and work of the papillary muscle, which is maintained even on the 45th day. Muscle power is significantly increased toward the end of the period studied. It is hypothesized that high-mountain hypoxia has a beneficial effect on the inotropic function of the intact myocardium. S.D.

A76-44716 # **Vestibular effects on the sensorimotor cortex in the cat after lesion of medial lemnisci (Vestibuliarnye vliianiia na sensomotornuiu koru koshki posle razrusheniia medial'nykh lemniskov).** E. M. Vereshchagina and G. P. Dem'ianenko (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 62, June 1976, p. 934-937. 5 refs. In Russian.

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STAR ENTRIES

N76-30784*# Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
PHOTOSYNTHETIC AND RESPIRATORY ACTIVITY IN GERMFREE HIGHER PLANT SPECIES Final Report
Jul. 1976 11 p
(Contract NAS9-12912)
(NASA-CR-147855) Avail: NTIS HC $3.50 CSCL 06C

Equipment developed for the study of gas exchange in germfree plants is described. The equipment includes a gas exchange chamber to house the plant under study, a gas feed assembly to introduce and remove gas from the chamber, and a clinostat to rotate the apparatus. Fluorescent and incandescent lights are used to illuminate the chamber and a sealed plastic barrier is used to isolate the potting soil from the chamber atmosphere. The gas outflow from the chamber can be diverted to an infrared CO2 analyzer. The performance of the system was evaluated. D.M.L.

N76-30785*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN AUTOMATED SYSTEM FOR CHROMOSOME ANALYSIS. VOLUME 1: GOALS, SYSTEM DESIGN, AND PERFORMANCE Final Report
K. R. Castleman and J. H. Melnyk (City of Hope Medical Center)
30 Jun. 1975 137 p refs Sponsored in part by NIH
(NASA-CR-148741; JPL-1200-240-Vol-1) Avail: NTIS HC $6.00 CSCL 06B

The design, construction, and testing of a complete system to produce karyotypes and chromosome measurement data from human blood samples, and a basis for statistical analysis of quantitative chromosome measurement data is described. The prototype was assembled, tested, and evaluated on clinical material and thoroughly documented. Author

N76-30786*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN AUTOMATED SYSTEM FOR CHROMOSOME ANALYSIS. VOLUME 2: SYSTEM CONSTRUCTION, PROGRAMMING, OPERATION, AND MAINTENANCE Final Report
K. R. Castleman and J. H. Melnyk (City of Hope Medical Center)
30 Jun. 1975 228 p refs Sponsored in part by NIH
(NASA-CR-148740; JPL-1200-240-Vol-2) Avail: NTIS HC $8.00 CSCL 06B

The operation, programming, construction, and maintenance of an automated chromosome analysis system is described. Author

N76-30787*# California Univ., Berkeley. Environmental Physiology Lab.
RESULTS FROM THE EPL MONKEY-POD EXPERIMENT CONDUCTED AS PART OF THE 1974 NASA/AMES SHUTTLE CVT-2
Donald F. Rahlmann, Arthur M. Kodama, Richard C. Mains, and Nello Pace 10 Jun. 1974 48 p refs
(Grant NGL-05-003-024)
(NASA-CR-148730; EPL-74-1) Avail: NTIS HC $4.00 CSCL 06D

The participation of the Environmental Physiology Laboratory (EPL) in the general purpose laboratory concept verification test 3 is documented. The EPL Monkey-Pod Experiment was designed to incorporate a 10-12 kg, pig tailed monkey, Macaca nemestrina, into the pod and measure the physiological responses of the animal continuously. Four major elements comprise the EPL Monkey-Pod Experiment System: (1) a fiberglass pod containing the instrumented monkey plus feeder and watering devices, (2) an inner console containing the SKYLAB mass spectrometer with its associated valving and electronic controls, sensing, control and monitoring units for lower body negative pressure, feeder activity, waterer activity, temperatures, and gas metabolism calibration, (3) an umbilical complex comprising gas flow lines and electrical cabling between the inner and outer console and (4) an outer console in principle representing the experiment support to be provided from general spacecraft sources. Author

N76-30788*# California Univ., Berkeley. Environmental Physiology Lab.
RESULTS FROM THE EPL MONKEY-POD EXPERIMENT CONDUCTED AS PART OF THE 1974 NASA-AMES CVT/GPL 3
Donald F. Rahlmann, Arthur M. Kodama, Richard C. Mains, and Nello Pace 10 Oct. 1974 55 p refs
(Grant NGL-05-003-024)
(NASA-CR-148736; EPL-74-2) Avail: NTIS HC $4.50 CSCL 06D

For abstract, see preceding accession.

N76-30789*# California Univ., Berkeley. Environmental Physiology Lab.
RESULTS FROM THE EPL MONKEY-POD FLIGHT EXPERIMENTS CONDUCTED ABOARD THE NASA/AMES CV-990, MAY 1976
Donald F. Rahlmann, Arthur M. Kodama, Richard C. Mains, and Nello Pace 30 Jul. 1976 141 p refs
(Grant NGL-05-003-024)
(NASA-CR-148737; EPL-76-1) Avail: NTIS HC $6.00 CSCL 06D

The participation of the Environmental Physiology Laboratory (EPL) in the general purpose laboratory concept verification test 3 is documented. The EPL Monkey-Pod Experiment was designed to incorporate a 10-12 kg, pig tailed monkey, Macaca nemestrina, into the pod and measure the physiological responses of the animal continously. Four major elements comprise the EPL Monkey-Pod Experiment System: (1) a fiberglass pod containing the instrumented monkey plus feeder and watering devices, (2) an inner console containing the SKYLAB mass spectrometer with its associated valving and electronic controls, sensing, control and monitoring units for lower body negative pressure, feeder activity, waterer activity, temperatures, and gas metabolism calibration, (3) an umbilical complex comprising gas flow lines and electrical cabling between the inner and outer console and (4) an outer console in principle representing the experiment support to be provided from general space craft sources. Author

N76-30790# BioTechnology, Inc., Falls Church, Va.
BIOMEDICAL ASPECTS OF AIRCRAFT ESCAPE AND SURVIVAL UNDER COMBAT CONDITIONS Final Report
Martin G. Every and James F. Parker, Jr. Mar. 1976 59 p refs Presented at Ann. Scientific Meeting - Aerospace Med. Assoc., 1976
(Contract N00014-72-C-0101; NR Proj. 105-667)
(AD-A021921) Avail: NTIS CSCL 06/7

Detailed event conditions and, to the extent possible, specific medical injury data now have been collected for Navy aircrewmen who ejected and were recovered, or became Prisoners of War in Southeast Asia. Initial analyses (previously reported) show the combat ejection, and consequently the associated injuries, to be appreciably more severe than encountered during non-combat operations. Additional analyses now have been conducted, primarily with repatriated Navy Prisoners of War, to establish some precise cause and effect injury relationships associated with high speed escape. The effect of escape injuries on subsequent evasion and survival is examined. Special attention is given to the effectiveness of escape, personal protective, and life support equipment. The adequacy of this equipment is evaluated in terms of an individual's injury condition and his success in using such equipment under the arduous conditions of combat escape, survival, rescue and capture. GRA

N76-30791# Battelle Pacific Northwest Labs., Richland, Wash.
EFFECTS OF ELECTRIC FIELDS ON LARGE ANIMALS. A FEASIBILITY STUDY Final Report
Richard D. Phillips, Richard L. Richardson, William T. Kaune, Dennis L. Hjeresen, and James L. Beamer Feb. 1976 165 p refs Sponsored by Electric Power Research Inst.
(PB-251632/6; EPRI/EC-131) Avail: NTIS HC $6.75 CSCL 06S

The project concerned experiments conducted to define the experimental conditions required for the long-term exposure of Hanford Miniature Swine (HMS) to high-strength 60 Hz electric fields and preparation of detailed experimental designs for the long-term exposure of HMS and for screening studies using rodents. Experiments were conducted at Bonneville Power Adm.'s 60 HZ Extra High Voltage (EHV) Laboratory at Ross Electrical Laboratories in Vancouver, WA, using four HMS to determine the maximum field strengths, up to 55 kV/m, which do not cause corona discharge, minishocks or hair stimulation. A description of the exposure facility and experimental procedures is given, the results of the tests are discussed, and experimental designs for proposed future research are described. Author

N76-30792 Washington Univ., Seattle.
THE EFFECTS OF ELECTROMAGNETIC FIELDS ON THE NERVOUS SYSTEM Ph.D. Thesis
Chung-Kwang Chou 1975 129 p
Avail: Univ. Microfilms Order No. 76-17430

The effects of electromagnetic fields on isolated nerves, ganglia, and muscles were studied in vitro. An S band wave guide exposure system in conjunction with a temperature controlled unit were used to expose the nervous tissues or muscle at a constant temperature. Results showed no effect other than thermal on the characteristics of nerves and muscles exposed to 2450 MHz microwave fields at specific absorption rate of 0.3 - 1500 W/kg for CW and 0.3 - 220 kW/kg peak for pulsed fields. The mechanisms of the microwave auditory effect were also investigated. Experiments on low frequency noise masking showed that only the high frequency portion of the auditory system is involved in the effect. The 50 kHz cochlear microphonics in guinea pig induced by microwave and laser pulses, as well as bone-conducted acoustic stimuli provided by a piezoelectric crystal, indicated that the microwave auditory effect is accompanied by a mechanical disturbance of the hair cells of the cochlea. The disturbance is probably due to thermal expansion in the head. Dissert. Abstr.

N76-30793* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VISUAL EXAMINATION APPARATUS Patent
Richard F. Haines, James W. Fitzgerald, and Salvadore A. Rositano, inventors (to NASA) Issued 3 Aug. 1976 10 p Filed 19 Mar. 1974 Supersedes N74-19761 (12 - 11, p 1257) Reissue of US Patent Appl. SN-159857, filed 6 Jul. 1971, US-Patent-3,737,214
(NASA-Case-ARC-10329-2; US-Patent-RE-28,921; US-Patent-Appl-SN-452768; US-Patent-Class-351-23; US-Patent-Class-351-30; US-Patent-Class-351-36; US-Patent-Appl-SN-159857; US-Patent-3,737,214) Avail: US Patent Office CSCL 14B

An automated visual examination apparatus for measuring visual sensitivity and mapping blind spot location including a projection system for displaying to a patient a series of visual stimuli. A response switch enables him to indicate his reaction to the stimuli, and a recording system responsive to both the visual stimuli per se and the patient's response. The recording system thereby provides a correlated permanent record of both stimuli and response from which a substantive and readily apparent visual evaluation can be made.
Official Gazette of the U.S. Patent Office

N76-30794 North Dakota Univ., Grand Forks.
EFFECTS OF LONG TERM HYPERBARIC OXYGEN EXPOSURE ON LUNG TISSUE: AN ULTRASTRUCTURAL EVALUATION Ph.D. Thesis
Brian Kent Ross 1975 133 p
Avail: Univ. Microfilms Order No. 76-18152

Both normal and oxygen toxic lung tissue were examined to determine the surface morphological characteristics of each. Separate groups of rats were exposed to 1 ATA room air and 21 ATA He-O2 with 200 mm Hg pO2 for 84 days. At intervals of 2, 3, 5, 8, 10, and 12 weeks, 8 experimental and 8 control animals were removed. The lungs of 7 animals of each group were analyzed for protein, lipid, and lung water. The lungs of the eighth animal were prepared for light microscopy. Separate groups of adult guinea pigs were exposed to 20 ATA He-O2 with 200, 400, and 600 mm Hg pO2 for 24, 12, and 6 days. Four animals were removed every 4 days in the two 24-day exposure groups, every 2 days in the 12-day exposure group, and every day in the 6-day exposure group. Lungs from 3 of the animals of each group wetre removed, weighed wet, freeze dried, and weighed dry. The lungs of 1 animal in each group of 4 were prepared for scanning electron microscopy.
Dissert. Abstr.

N76-30795 North Dakota Univ., Grand Forks.
CARDIAC OUTPUT AND ITS DISTRIBUTION UNDER HYPERSONIC CONDITIONS Ph.D. Thesis
Lawrence E. Boerboom 1975 78 p
Avail: Univ. Microfilms Order No. 76-18141

The purpose of this investigation was two-fold -- first, to devise techniques for determination of cardiac output and its distribution and other related cardiovascular parameters under hyperbaric conditions; second, to use these techniques to assess cardiovascular function in animals respiring normoxic levels of helium-oxygen (He-O2) at 1.0 and 11.0 ATA. Parameters studied were blood pressure, heart rate, stroke volume, cardiac output, total peripheral resistance, circulation time, distribution of cardiac output, organ blood flow and organ resistance to flow. Tissues studied were heart, lung, liver, spleen, kidney, adrenal, brain, femur, diaphragm, colon, duodenum, fat, muscle and skin. Although there were minor but significant changes in some parameters, these results suggest that He-O2 and pressure do not seriously compromise cardiovascular function. Dissert. Abstr.

N76-30796*# Stanford Univ., Calif. Integrated Circuits Lab.
ULTRASONIC DOPPLER MEASUREMENT OF RENAL ARTERY BLOOD FLOW Annual Report, 1 Sep. 1975 - 31 Jul. 1976
William R. Freund, William L. Beaver, and James D. Maindl Aug. 1976 18 p refs
(Grant NGR-05-020-615)
(NASA-CR-148780; SU-SEL-76-030; TR-4962-3) Avail: NTIS HC $3.50 CSCL 06B

Studies were made of (1) blood flow redistribution during lower body negative pressure (LBNP), (2) the profile of blood flow across the mitral annulus of the heart (both perpendicular and parallel to the commissures), (3) testing and evaluation of a number of pulsed Doppler systems, (4) acute calibration of perivascular Doppler transducers, (5) redesign of the mitral flow transducers to improve reliability and ease of construction, and (6) a frequency offset generator designed for use in distinguishing forward and reverse components of blood flow by producing frequencies above and below the offset frequency. Finally, methodology was developed and initial results were obtained from a computer analysis of time-varying Doppler spectra.
Author

N76-30797*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION BEAM SPUTTER MODIFICATION OF THE SURFACE MORPHOLOGY OF BIOLOGICAL IMPLANTS
A. J. Weigand and B. A. Banks 1976 19 p refs Presented at 23d Natl. Vacuum Symp., Chicago, 21-24 Sep. 1976; sponsored by Am. Vacuum Soc.
(NASA-TM-X-73468; E-8840) Avail: NTIS HC $3.50 CSCL 06B

The surface chemistry and texture of materials used for biological implants may significantly influence their performance and biocompatibility. Recent interest in the microscopic control of implant surface texture has led to the evaluation of ion beam

sputtering as a potentially useful surface roughening technique. Ion sources, similar to electron bombardment ion thrusters designed for propulsive applications, are used to roughen the surfaces of various biocompatible alloys or polymer materials. These materials are typically used for dental implants, orthopedic prostheses, vascular prostheses, and artificial heart components. Masking techniques and resulting surface textures are described along with progress concerning evaluation of the biological response to the ion beam sputtered surfaces. Author

N76-30798*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN AUTOMATED SYSTEM FOR CHROMOSOME ANALYSIS Final Report
K. R. Castleman and J. H. Melnyk, (City of Hope Medical Center)
7 Apr. 1976 138 p refs Sponsored in part by NIH
(NASA-CR-148755; JPL-5040-30) Avail: NTIS HC $6.00 CSCL 06D

The design, construction, and testing of a complete system to produce karyotypes and chromosome measurement data from human blood samples, and to provide a basis for statistical analysis of quantitative chromosome measurement data are described. Author

N76-30799# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
RADIATION EXPOSURE RECORDS MANAGEMENT
H. P. Boiter Dec. 1975 9 p Presented at the 9th Topical Symp. on Operational Health Physics, Denver, Colo., 9-12 Feb. 1976
(Contract AT(07-2)-1)
(DPSPU-75-30-7; Conf-760202-29) Avail: NTIS HC $3.50

Management of individual radiation exposure records begins at employment with the accumulation of data pertinent to the individual and any previous occupational radiation exposure. Appropriate radiation monitoring badges or devices are issued and accountability established. A computer master file is initiated to include the individual's name, payroll number, social security number, birth date, assigned department, and location. From this base, a radiation exposure history is accumulated to include external ionizing radiation exposure to skin and whole body, contributing neutron exposure, contributing tritium exposure, and extremity exposure. It is used also to schedule bioassay sampling and in-vivo counts and to provide other pertinent information. The file is used as a basis for providing periodic reports to management and monthly exposure summaries to departmental line supervision to assist in planning work so that indidividual annual exposures are kept as low as practical. Author (NSA)

N76-30800# Veterans Administration Hospital, Brooklyn, N. Y. Interface Lab.
IDENTIFICATION OF PROTEINS INTERACTING AT BLOOD OR PLASMA/BIOMATERIAL INTERFACES: RELATION TO PLATELET AND WHITE CELL ADHESION, AND TO CLOTTING Annual Report, Oct. 1974 - Oct. 1975
Leo Vroman and Priscilla C. Munoz Feb. 1976 82 p refs
(Contract PHS-HB-50001)
(PB-251768/8; MRIS-9095-75;
NIH/NHLI-Y01-HB-5-0001-01-2) Avail: NTIS HC $5.00 CSCL 06L

Of the many materials tested so far, only tetramethyldisiloxane appeared to adsorb albumin out of normal plasma to some degree. Various carbon-coated materials adsorbed fibrinogen out of plasma without converting it rapidly. The importance of fibrinogen adsorption to subsequent platelet adhesion may have its parallel in the role of globulin adsorption to subsequent granulocyte adhesion. It is found that in whole blood or plasma, these cells adhered and spread only where a hydrophobic (rather than a hydrophilic) material had been pre-exposed to gamma globulins. Since either adsorbed globulin orientation or perhaps selective adsorption of Kallikrein is the cause, it too will be studied. GRA

N76-30801# Naval Submarine Medical Research Lab., Groton, Conn.
CARBON DIOXIDE EFFECTS UNDER CONDITIONS OF RAISED ENVIRONMENTAL PRESSURE Interim Report
K. E. Schaefer 26 Dec. 1974 41 p refs
(AD-A020472; NSMRL-804) Avail: NTIS CSCL 06/9

Exposure to the increased barometric pressure, such as encountered under water, affects the mechanics of respiration and in particular the behavior of respiratory gases. Carbon dioxide plays a major role in the physiology of the high-pressure environment since increased breathing resistance easily leads to carbon dioxide retention, as has frequently been noted in scuba and helmet diving. Pulmonary gas exchange in breathhold diving is influenced by the compression and decompression events, resulting in a reversed carbon dioxide gradient during descent. The alveolar carbon dioxide level can be controlled during ascent from depth by controlling the speed of ascent which is of significance to both breathhold diving and the buoyant ascents of submarine escape. Investigations of pulmonary gas exchange in rest and exercise during exposure to high pressure while breathing helium-oxygen gas mixtures have demonstrated the existence of respiratory limitations and associated CO2 retention when divers are performing heavy work. In shallow habitat air diving using combinations of air and normoxic nitrogen-oxygen breathing mixtures, evidence for the development of slight respiratory acidosis and CO2 retention was obtained. GRA

N76-30802# California Univ., Santa Barbara. Inst. of Environmental Stress.
EFFECTS OF LOW LEVELS OF OZONE AND TEMPERATURE STRESS Annual Report, 1 Jul. 1974 - 30 Jun. 1975
Steven M. Horvath and Lawrence J. Folinsbee Mar. 1976 96 p refs
(Contract EPA-68-02-1723)
(PB-252309/0; EPA-600/1-76-001) Avail: NTIS HC $5.00 CSCL 06T

Cardiopulmonary and metabolic responses of 20 adult males (age 19-29) before, during and after a 2-hour exposure to either filtered air or 0.50 ppm ozone under four ambient conditions (25C, 45% rh; 31C, 85% rh; 35C, 40% rh; 40C, 50% rh) were determined. Exercise at 40% of the individual's V02 max was performed from 60-90 min of exposure. There were no cardiovascular changes due to ozone exposure but heart rate increased and stroke volume decreased with increasing heat stress. Rectal, mean body, and mean skin temperature also increased. There was a decrease in vital capacity and total lung capacity due primarily to a reduction of inspiratory capacity following ozone exposure. GRA

N76-30803# Washington Univ., Seattle. School of Medicine.
ACID BASE CHEMISTRY AND HUMAN BONE Annual Progress Report, 1 Jul. 1974 - 30 Jun. 1975
James M. Burnell 31 Jul. 1975 42 p refs
(Grant AM-32208)
(PB-251395/0; AK-1-3-2208) Avail: NTIS HC $4.00 CSCL 06E

It is postulated that magnesium and calcium compete at the cellular level. Incorporation of excess Mg results in defective mineralization. Supplemental Ca by oral or dialytic route corrects the abnormal mineralization toward normal. Decreasing Mg is under investigation. Experimental data in humans and in rats suggest a common pathway for all hypocalcemic states including uremia. GRA

N76-30804*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PREDICTION OF PASSENGER RIDE QUALITY IN A MULTIFACTOR ENVIRONMENT
Thomas K. Dempsey and Jack D. Leatherwood Sep. 1976 41 p refs Presented at 84th Annual Convention of the Am. Psychological Association, Washington, D.C., 3-7 Sep. 1976
(NASA-TM-X-73945) Avail: NTIS HC $4.00 CSCL 05E

A model being developed, permits the understanding and prediction of passenger discomfort in a multifactor environment with particular emphasis upon combined noise and vibration. The model has general applicability to diverse transportation systems and provides a means of developing ride quality design criteria as well as a diagnostic tool for identifying the vibration

and/or noise stimuli causing discomfort. Presented are: (1) a review of the basic theoretical and mathematical computations associated with the model, (2) a discussion of methodological and criteria investigations for both the vertical and roll axes of vibration, (3) a description of within-axis masking of discomfort responses for the vertical axis, thereby allowing prediction of the total discomfort due to any random vertical vibration, (4) a discussion of initial data on between-axis masking, and (5) discussion of a study directed towards extension of the vibration model to the more general case of predicting ride quality in the combined noise and vibration environments. Author

N76-30805*# Martin Marietta Corp., Denver, Colo.
FLIGHT OPERATIONS PAYLOAD TRAINING FOR CREW AND SUPPORT PERSONNEL. TASK 3: INFLIGHT OPERATIONS AND TRAINING FOR PAYLOADS
R. F. Beardslee 1 Jun. 1976 102 p
(Contract NAS9-14676)
(NASA-CR-147837) Avail: NTIS HC $5.50 CSCL 05I

Various degrees of Commander/Pilot involvement in on-orbit operation of payloads are examined. Constraints and limitations resulting from their participation or affecting their ability to participate are identified. Four options, each representing a different set of involvement depths and concepts are analyzed. Options identified are boundaries around extremes in Commander/Pilot payload involvement. Real world choices may fall somewhere in between, but for the purposes of this study the options as represented provide a matrix from which logical and practical decisions can be made about crew participation in payload operations. Author

N76-30806# National Swedish Inst. for Building Research, Stockholm.
A SYSTEM FOR THE DESCRIPTION AND CLASSIFICATION OF MOVEMENT BEHAVIOUR
Gun Hallberg 1975 56 p refs
(PB-251337/2; D12-1975) Avail: NTIS HC $4.50 CSCL 05E

The need for an adequate description of individual characteristics, which are relevant for determining human functional dimensions, has emerged ever more clearly in conjunction with the studies carried out of fundamental dimensional requirements for the design of rooms, furniture and fittings with regard to human functional dimensions. Certain connections have been found between body dimensions - particularly heights - and certain functional dimensions. The present study is limited to the manner in which movement behavior manifests itself externally since a penetration of the physiological and psychological background would lead far beyond the subject limits. Author (GRA)

N76-30807# General Electric Co., Daytona Beach, Fla. Space Systems Div.
ADVANCED SIMULATION IN UNDERGRADUATE PILOT TRAINING: COMPUTER IMAGE GENERATION Final Report, Feb. 1972 - Sep. 1974
H. Beardsley, W. Bunker, A. Eibeck, J. Juhlin, W. Kelly, J. Page, and L. Shaffer Nov. 1975 271 p
(Contract F33615-72-C-1717; AF Proj. 1192)
(AD-A022251; AFHRL-TR-75-59(5)) Avail: NTIS CSCL 05/9

The Advanced Simulation for Undergraduate Pilot Training (ASUPT) system is an advanced simulation system that will be used in a research program by this laboratory (AFHRL) to investigate the simulator role in future Undergraduate Pilot Training programs. The ASUPT simulates the Air Force's primary jet trainer, the Cessna T-37B aircraft. A Computer Image Generator (CIG) system has been developed to provide for a visual simulation of the terrain and other aircraft for research operations in the T-37B aircraft simulator. This CIG development represents an advancement in image generation technology for visual simulation. This report documents the technical development and capabilities of this ASUPT visual simulation system (and thereby, its related technology areal for dissemination to interested and concerned Air Force and Department of Defense personnel and the scientific community. GRA

N76-30808 North Carolina State Univ., Raleigh.
THE EFFECTS OF PERSPIRATION ON ADSORPTION DYNAMICS OF PROTECTIVE CLOTHING MATERIAL Ph.D. Thesis
Arun Pal Aneja 1975 240 p
Avail: Univ. Microfilms Order No. 76-14312

A protective overgarment material of carbon-impregnated polyurethane foam was studied. The dynamics of carbon tetrachloride vapor adsorption, the effect of perspiration poisoning, and methods to alleviate perspiration poisoning for this material were investigated. A central composite statistical design of experiments was conducted on the carbon-impregnated foam in a vapor test apparatus to study adsorption dynamics. A mathematical model was developed up to the breakthrough time, i.e., the run time at which the exiting vapor concentration is 5 percent of the inlet concentration. The organic constituents of sweat were shown to cause the poisoning action, results indicated that lactic acid is primarily responsible. The possibility of increasing the capacity of the existing foam material by radiation treatment was studied, but with inconclusive results. To reduce the deleterious effects of sweat on the adsorptive properties of carbon impregnated foam material, the possibility of selective removal of lactic acid was studied. This was accomplished by chemically modifying an undershirt material to give it ion exchange properties. Dissert. Abstr

N76-30809*# Technology, Inc., Houston, Tex. Life Sciences Div.
FOOD DEPOT: APOLLO-SOYUZ TEST PROJECT Final Report
Charles T. Bourland 26 Aug. 1975 67 p
(Contract NAS9-13291)
(NASA-CR-147858) Avail: NTIS HC $4.50 CSCL 06H

The Food Depot operations required to produce the ASTP Food System, the food system and some analysis and recommendations related to future operations are described. Author

N76-30810*# General Electric Co., Philadelphia, Pa. Space Div.
MODULAR BIOWASTE MONITORING SYSTEM CONCEPTUAL DESIGN
G. L. Fogal Oct. 1974 149 p
(Contract NAS9-13748)
(NASA-CR-147867; Doc-74SD4254) Avail: NTIS HC $6.00 CSCL 06B

The objective of the study was to define requirements and generate a conceptual design for a Modular Biowaste Monitoring System for specifically supporting shuttle life science experimental and diagnostic programs. Author

N76-30811*# Agnew Tech-Tran, Inc., Woodland Hills, Calif.
HUMAN FACTORS ENGINEERING AND TECHNICAL PROGRESS
V. F. Rubakhin Washington NASA Mar. 1976 18 p refs Transl. into ENGLISH from Vestnik AN SSSR (USSR), no. 11, Nov. 1975 p 59-66
(Contract NASw-2789)
(NASA-TT-F-16931) Avail: NTIS HC $3.50 CSCL 05E

The present state of human factors engineering and its basic theoretical foundations are reviewed. At present, it is concerned with elaborating the methodological foundations for developing control systems for complex industrial processes, optimizing the flow and structure of information within these systems, and determining the technical and practical feasibility of automating human production. Certain generally accepted principles of human factors engineering are discussed, and theoretical and practical work by a number of researchers is reviewed. A significant improvement in the effectiveness of research in aerospace technology is noted. The establishment is suggested of a Human Factors Engineering Service, which would have three divisions concerned with design of man machine systems, monitoring and control of work quality, and selection and training of specialists. Author

N76-30812*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 28: EXPERIMENTAL ECOLOGICAL SYSTEMS INCLUDING MAN
I. I. Gitelson, B. G. Kovrov, G. M. Lisovskiy, Yu N. Okladnikov, M. S. Rerberg, F. Ya. Sidko, and I. A. Terskov Washington NASA Jun. 1976 351 p refs Transl. into ENGLISH of the book "Problemykosmicheskoy biologii. Tom 28. Eksperimental'nyye ekologicheskiye sistemy vklyuchayushchiye cheloveka" Moscow, Nauka Press, 1975 p 1-312
(Contract NASw-2790)
(NASA-TT-F-16993) Avail: NTIS HC $10.50 CSCL 06K

The monograph is devoted to analysis of the problems of creation of a human life support system, based on the biological cycle of matter, and to experimental implementation of such systems. Questions of the ecology and technology of the links which form the system are examined; special attention is given to small closed ecosystems, as a new subject of investigation. The physiological reactions of man living in an experimental ecological system are described. The scientific and applied prospects of further development and use of artificial ecological systems, for solution of space and terrestrial problems, are discussed. Author

N76-30813*# Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Apr. - 30 Jun. 1976
A. L. Reyes, J. E. Campbell, A. J. Wehby, R. G. Crawford, J. C. Wimsatt, and J. T. Peeler Aug. 1976 9 p refs
(NASA Order W-13411)
(NASA-CR-148004; QPR-45) Avail: NTIS HC $3.50 CSCL 06M

The thermal resistance of vegetative cells in the percent RH range of 0.19 to 100 at 60 C was investigated. Staphylococcus aureus was used in the experiment because of the extension of the moisture range that can be examined. Author

N76-30814*# Martin Marietta Aerospace, Denver, Colo.
PAYLOAD/ORBITER CONTAMINATION CONTROL REQUIREMENT STUDY: PRELIMINARY CONTAMINATION MISSION SUPPORT PLAN
L. E. Bareiss, V. W. Hooper, and E. B. Ress 31 Aug. 1976 6 p
(Contract NAS8-31574)
(NASA-CR-149983; MCR-76-271) Avail: NTIS HC $3.50 CSCL 22B

Progress is reported on the mission support plan and those support activities envisioned to be applicable and necessary during premission and postmission phases of the Spacelab program. The purpose, role, and requirements of the contamination control operations for the first two missions of the Spacelab equipped Space Transportation System are discussed. The organization of the contamination control operation and its relationship to and interfaces with other mission support functions is also discussed. Some specific areas of contamination to be investigated are treated. They are: (1) windows and viewports, (2) experiment equipment, (3) thermal control surfaces, (4) the contaminant induced atmosphere (as differentiated from the normal ambient atmosphere at the orbit altitude), and (5) optical navigation instruments. Author

N76-30815*# Life Systems, Inc., Cleveland, Ohio.
SOLID ELECTROLYTE OXYGEN REGENERATION SYSTEM Interim Report, 26 Sep. 1973 - 31 Mar. 1976
J. W. Shumar, G. G. See, F. H. Schubert, and J. D. Powell Jul. 1976 201 p refs
(Contract NAS2-7862)
(NASA-CR-137813; LSI-ER-190-12) Avail: NTIS HC $7.75 CSCL 06K

A program to design, develop, fabricate and assemble a one-man, self-contained, solid electrolyte oxygen regeneration system (SX-1) incorporating solid electrolyte electrolyzer drums was completed. The SX-1 is a preprototype engineering model designed to produce 0.952 kg (2.1 lb)/day of breathable oxygen (O2) from the electrolysis of metabolic carbon dioxide (CO2) and water vapor. The CO2 supply rate was established based on the metabolic CO2 generation rate for one man of 0.998 kg (2.2 lb)/day. The water supply rate (0.254 kg (0.56 lb)/day) was designed to be sufficient to make up the difference between the 0.952 kg (2.1 lb)/day O2 generation specification and the O2 available through CO2 electrolysis, 0.726 kg (1.6 lb)/day. The SX-1 was successfully designed, fabricated and assembled. Design verification tests (DVT) or the CO Disproportionators, H2 separators, control instrumentation, monitor instrumentation, water feed mechanism were successfully completed. The erratic occurrence of electrolyzer drum leakage prevented the completion of the CO2 electrolyzer module and water electrolyzer module DVT's and also prevented the performance of SX-1 integrated testing. Further development work is required to improve the solid electrolyte cell high temperature seals. Author

N76-30816# Southampton Univ. (England). Inst. of Sound and Vibration Research.
THE EVALUATION OF HUMAN EXPOSURE TO HELICOPTER VIBRATION
Michael J. Griffin Sep. 1975 46 p refs
(Contract MIN-DEF-AT/2040/0165/AE)
(ISVR-TR-78) Avail: NTIS HC $4.00

The form of a new procedure for evaluating helicopter vibration is described. Guidance to aircraft designers is offered for three categories of vibration exposure: whole-body vibration of aircrew, the legibility of vibrating instruments, and local vibration of aircrew heads, hands, and feet. The derivation of the evaluation procedure is presented and areas where more research is required are defined. Examples of how the procedure may be used to evaluate helicopter vibration are given and the vibration conditions reported in some helicopters are compared with the recommended vibration limits. Author (ESA)

N76-31882# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
ANALYSIS OF THE PREFERENTIAL RELEASE OF NEWLY SYNTHESIZED ACh BY CORTICAL SLICES FROM RAT BRAIN WITH THE AID OF TWO DIFFERENT LABELLED PRECURSORS
P. C. Molenaar and R. L. Polak (Sylvius Labs.) 1975 23 p refs Sponsored by the Promeso Found.
(MBL-1975-14; TDCK-66580) Avail: NTIS HC $3.50

The release of newly synthesized acetylcholine (ACh) by cortical slices from rat brain in the presence of 25 mM KCl was studied. The slices were incubated for 5 min in a medium containing both 2-(C-14)-pyruvate and choline labelled with 3 deuterium atoms 3-(D-2)-Ch in order to label at the same time the acetyl moiety and the choline moiety of ACh. The non-labelled ACh and the 3-(D-2)-ACh were measured by pyrolysis-gas chromatography/mass spectrometry, and the (C-14)-ACh by liquid scintillation counting. It was found that the newly formed (C-14)-ACh as well as the newly formed 3-(D-2)-ACh had a more than 2.5 times greater probability of being released than the preformed nonlabelled ACh. These findings strongly suggest that it is not simply the ACh synthesized immediately inside the nerve ending membrane from incoming undiluted labelled choline which is preferentially released, but that all newly formed ACh has a greater probability of being released than preformed ACh. No preferential release of newly formed ACh was observed when the incubation medium contained 5.6 mM pyruvate instead of 10 mM glucose + 0.6 mM pyruvate. The cause of this difference remains unexplained. Author (ESA)

N76-31883# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
THE ROLE OF INITIATION FACTOR-3 IN THE TRANSLATION OF T7- AND Ø80 trp MESSENGER RNA
Rob Benne (Calif. Univ., Davis) and Peter H. Pouwels 1975 22 p refs

(MBL-1975-15; TDCK-66582) Avail: NTIS HC $3.50

The deoxyribonucleic acid (DNA) dependent synthesis of proteins was studied with a system composed of DNA, washed ribosomes, centrifuged (150,000 xg) bacterial extract from Escherichia coli and purified initiation factors IF-1 and IF-2. Synthesis of active enzymes encoded by the tryptophan (trp)-operon of E. coli was found to depend strongly on the addition of IF-3, with the same IF-3 dependency for all 5 gene-products of this operon, irrespective of the presence of the promotor proximal gene trpE. Synthesis of T7 RNA polymerase with T7 DNA as a template, however, was completely independent of the addition of IF-3. The same difference in IF-3 requirement was found when the overall protein synthesis directed by these templates was compared. This difference could be related to the effect of IF-3 on the formation of initiation complexes with the in vitro prepared mRNA: initiation complexes are readily formed with T7 mRNA also in the absence of IF-3, whereas the formation of these complexes with O80trp mRNA depends almost completely on the presence of this factor. Author (ESA)

N76-31884# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

THE EFFECT OF ACTH-ANALOGUES ON MOTOR BEHAVIOR AND VISUAL EVOKED RESPONSE IN RATS

Otto L. Wolthuis and David deWied (Rudolf Magnus Inst. for Pharmacol.) 1975 23 p refs

(MBL-1975-17; TDCK-66581) Avail: NTIS HC $3.50

Averaged Visual Evoked Responses (VER) in cortical area 17 were recorded one hour after the administration of 7-l-phe ACTH (4-10) or 7-d-phe ACTH(4-10) to artificially ventilated rats, paralyzed with gallamine. In addition, the effects of these peptides on spontaneous motor behavior were analyzed. Results show that the latencies of all VER components remain unchanged and the amplitudes of the primary VER were unaffected. Measured at a wide variety of light intensities, however, the amplitudes of the VER afterdischarges were significantly and very similarly diminished by both peptides, the effect of 7-l-phe ACTH(4-10) being somewhat stronger than that of 7-d-phe ACTH(4-10). These results support the notion, advanced by others, that these peptides have an effect on a central nervous system vigilance regulating system, yet do not explain the reported opposite effects on active avoidance behavior of the two related peptides. The effects appear specific since spontaneous motor behavior, as index of changes in generalized arousal, is unaffected by these two peptides.

Author (ESA)

N76-31885# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

ENHANCING EFFECT OF RADIORESISTANT SPLEEN CELLS ON THE PRIMARY IMMUNE RESPONSE AGAINST SHEEP RBC BY MOUSE SPLEEN CELLS IN VITRO

F. H. Lubbe and O. B. Zaalberg Sep. 1975 13 p refs

(MBL-1975-19; TDCK-66738) Avail: NTIS HC $3.50

Irradiated spleen cells cultured for 3 days caused a stimulation of the primary in vitro immune response by normal spleen cells. These irradiated spleen cells were fractionated by velocity sedimentation and the fractions were tested for their stimulating activity. Only the macrophage enriched fractions were found to cause stimulation. The macrophages in these fractions were stuffed with erythrocytes and dead cells. The fractions, enriched in thymus derived cells, had no effect on the immune response. Irradiated spleen cells cultured for 24 hr caused inhibition. It has not yet been determined whether this inhibition was due to some transient change in the macrophage population during incubation. The stimulating effect by the irradiated spleen cells from SPF (specific pathogen free) mice was strongly reduced, which could be ascribed at least partly to the naturally occurring low number of macrophages in the spleens of these mice. Author (ESA)

N76-31886# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

INVESTIGATION ON THE HYDRODYNAMIC PROPERTIES OF DNA IN FORMAMIDE-WATER MIXTURES WITH VARIOUS IONIC STRENGTHS

A. C. M. VanderDrift and W. Sluiter Sep. 1975 57 p refs

(MBL-1975-20; TDCK-66736) Avail: NTIS HC $4.50

The hydrodynamic behavior of four homogeneous linear double-stranded phage deoxyribonucleic acids (O29, T7, PP8, and T4) were investigated by means of viscometry and velocity sedimentation at 20 C in formamide-water mixtures, 50% w/w at various concentrations of NaCl. The experimental data can be adequately analyzed in terms of the worm-like chain model modified for excluded volume effects. With increasing ionic strength the excluded volume parameter shows no significant changes, whereas the Kuhn statistical segment length and the effective Stokes diameter of the hydrodynamic units decrease; the mutual distance between the unit elements, however, remains rather constant. From these results it is concluded that formamide mainly destabilizes the intramolecular base-stacking whereas the NaCl primarily shields local intramolecular electrostatic repulsions which is attended by obvious desolvation. Author (ESA)

N76-31887# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

PIRACETAM AND ACQUISITION BEHAVIOR IN RATS: ELECTROPHYSIOLOGICAL AND BIOCHEMICAL EFFECTS

O. L. Wolthuis and V. J. Nickolson Dec. 1975 35 p refs Sponsored by the FUNGO Found. for Med. Res.

(MBL-1975-24; TDCK-67177) Avail: NTIS HC $4.00

Effects of piracetam on cortical electrical phenomena in rats following visual stimulation were studied. An investigation of the biochemical mechanisms underlying the effects of the drug was started by studying possible effects on protein and energy metabolism. It was found that piracetam increases the chance that a light stimulus is followed by a large surface negative cortical potential (peak) in animals paralyzed with tubocurarine. Injection of the drug also increases the chance that the peaks will follow the flash after a constant interval. Piracetam has no effect on the spontaneous occurrence of these peaks. In animals paralyzed with gallamine no peaks occur and piracetam causes an increase of the amplitudes of the classical visually evoked response, both of the primary response as well as of the after-discharges. It is concluded that piracetam facilitates central registration mechanisms, an effect which could be responsible for the enhancement of acquisition by the drug.

Author (ESA)

N76-31888# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

BINDING OF RADIATION-INDUCED PHENYLALANINE RADICALS TO DNA: INFLUENCE ON THE BIOLOGICAL ACTIVITY OF THE DNA AND ON ITS SENSITIVITY TO THE INDUCTION OF BREAKS BY GAMMA RAYS

G. P. VanderSchans, C. J. S. VanRijn, and J. F. Bleichrodt Nov. 1975 29 p refs

(MBL-1975-27; TDCK-67114) Avail: NTIS HC $4.00

When an aqueous solution of double-stranded deoxyribonucleic acid (DNA) of bacteriophage PM2 containing phenylalanine and saturated with N2O is irradiated with gamma rays, radiation induced phenylalanine radicals are bound covalently. Under the conditions used about 25 phenylalanine molecules may be bound per lethal hit. Also for single-stranded PM2 DNA most of the phenylalanine radicals bound are nonlethal. Evidence is presented that in double-stranded DNA an appreciable fraction of the single-strand breaks is induced by phenylalanine radicals. Radiation products of phenylalanine and the phenylalanine bound to the DNA decrease the sensitivity of the DNA to the induction of single-strand breaks. There are indications that the high efficiency of protection by radiation products of phenylalanine is due to their positive charge, which will result in a relatively high concentration of these compounds in the vicinity of the negatively charged DNA molecules. Author (ESA)

N76-31889# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

RADIOSENSITIZATION OF MAMMALIAN CELLS BY DIAMIDE

O. Vos, G. A. Grant (Defence Res. Estab., Ottawa), and L. Budke Jan. 1976 22 p refs

(MBL-1976-1; TDCK-67285) Avail: NTIS HC $3.50

The effect of diamide on the radiosensitivity of T-cells was investigated under oxic and anoxic conditions. The compound was found to sensitize the cells under both conditions. Under oxic conditions, exposure for 10 min before and during irradiation to 0.1, 0.5, and 1.0 mm diamide produced dose-modifying factors of 0.81, 0.60, and 0.55, respectively. Under anoxic conditions exposure for 10 min before and during irradiation to 0.5 mm produced a dose-modifying factor of 0.34. When the cells in oxic conditions were exposed for just 20 min before irradiation, the sensitizing effect was smaller, but some sensitization effect was still apparent after a 120 min interval between diamide treatment and irradiation. Diamide also sensitized the cells after irradiation but this effect was less than when it was present during irradiation. It is proposed that sensitization is due to lack of capacity for repair of radicals by hydrogen transfer and biochemical repair processes. Author (ESA)

N76-31890# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

KINETICS AND LOCALIZATION OF IgE TETANUS ANTIBODY RESPONSE IN MICE IMMUNIZED BY THE INTRATRACHEAL, INTRAPERITONEAL AND SUBCUTANEOUS ROUTES

Jan L. J. Gerbrandy, Ernst A. VanDura, and John Bienenstock (McMaster Univ.) 1976 24 p refs Sponsored partly by Ontario Thoraric Soc. and Med. Res. Council of Can.

(MBL-1976-2; TDCK-67286) Avail: NTIS HC $3.50

The heterologous adoptive cutaneous anaphylaxis system was used to determine the kinetics of appearance of IgE producing cells in various lymphoid tissues of mice following intratracheal, intraperitoneal, or subcutaneous immunization with tetanus toxoid and Bordetella pertussis organisms. Intratracheal and intraperitoneal immunization produced similar patterns of response with the bronchial lymphoid nodes quantitatively exceeding the responses in other lymphoid tissues. Although a dissociation was seen between responses obtained in various lymphoid tissues following subcutaneous and intraperitoneal or intratracheal immunization, no real evidence for a local mucosal response, such as has been reported for IgA, was obtained. These results lend experimental support to the observations that intratracheal and intraperitoneal immunization routes are most effective in production of IgE antibodies. Author (ESA)

N76-31891# School of Aerospace Medicine, Brooks AFB, Tex.

THE BIOLOGICAL SIGNIFICANCE OF RADIO-FREQUENCY RADIATION EMISSION ON CARDIAC PACEMAKER PERFORMANCE Interim Report, Jan.-Aug. 1975

John C. Mitchell and William D. Hurt Jan. 1976 23 p refs (AF Proj. 7757)

(AD-A022886; SAM-TR-76-4) Avail: NTIS CSCL 06/18

The effect of radiofrequency (RF) radiation emission on cardiac pacemaker function is a unique bioeffects phenomenon. Dependent on the pacemaker type and design, and on the frequency, peak E-field intensity, pulse width, and effective pulse repetition rate of the incident RF signal, the pacemaker may cut off completely, revert to a fixed interference-rejection mode of operation, experience intermittent disruption, or be totally unaffected. Experimental evidence is presented for a wide variety of tests conducted under controlled laboratory conditions and in the vicinity of numerous types of RF emitters prevalent in U.S. population centers. These test results are discussed in terms of their clinical significance, technical feasibility of designing pacemakers to avoid electromagnetic interference, and appropriate design goals to achieve overall RF environmental compatibility. Author (GRA)

N76-31892# IIT Research Inst., Chicago, Ill.

GERMINATION AND EARLY GROWTH OF SUNFLOWERS IN WEAK ELF ELECTROMAGNETIC FIELDS Final Report

G. M. Rosenthal, Jr. May 1975 38 p refs

(Contract N00039-73-C-0030)

(AD-A023092) Avail: NTIS CSCL 06/18

Sunflowers (Helianthus annuus) were raised in a weak ELF electromagnetic field under controlled laboratory conditions and in a greenhouse. The field levels were 10 or 1 volt/meter rms electric field and 1 gauss rms magnetic field at 75 Hz. The observations and statistical analysis of these experiments are documented in the report. It has been concluded that under field conditions the small, but probably real, effects of a weak electromagnetic field would be indistinct from, and interact with, those brought about by any other micro-environmental factors. GRA

N76-31893# IIT Research Inst., Chicago, Ill.

ELF ELECTROMAGNETIC FIELD EFFECTS ON LIFE FORMS, BIBLIOGRAPHY

Vincent C. Formanek Apr. 1976 183 p refs

(Contract N00039-73-C-0030; IITRI Proj. E6249)

(AD-A023094; IITRI-E6249-TR-2) Avail: NTIS CSCL 06/18

During the course of a study, supported by an IITRI project with the Electric Power Research Institute, some 2300 references were identified which were then reduced to some 800 citations. With that as a starting point, this bibliography has been prepared to aid in the assessment of extremely low frequency biological research. This bibliography emphasizes the following: (1) AC electric and magnetic fields, biological effects between 45-75 Hertz; (2) AC electric and magnetic fields, alpha-rhythm interactions between 1-15 Hertz; (3) AC electric and magnetic field influences on patients with cardiac pacemakers; (4) Behavioral influences: (a) migration (b) orientation (c) sensing-detection. Author (GRA)

N76-31894*# Martin Marietta Corp., Denver, Colo.

SEPARATION OF GRANULOCYTES FROM WHOLE BLOOD BY LEUKOADHESION, PHASE 1 Final Report

Jun. 1976 64 p refs

(Contract NAS9-14545)

(NASA-CR-147883; MCR-76-272) Avail: NTIS HC $4.50 CSCL 06A

Capillary glass tubes are investigated for the separation and retrieval of large quantities of viable granulocytes and monocytes from whole blood on a continuous basis from a single donor. This effort represented the feasibility demonstration of a three phase program for development of a capillary tube cell separation device. The activity included the analysis and parametric laboratory testing with subscale models required to design a prototype device. Capillary tubes 40 cm long with a nominal 0.030 cm internal diameter yielded the highest total process efficiency. Recovery efficiencies as high as 89% of the adhering cell population were obtained. Granulocyte phagocytosis of latex particles indicated approximately 90% viability. Monocytes recovered from the separation column retained their capability to stimulate human bone marrow colony growth, as demonstrated in an in vitro cell culture assay. Author

N76-31895*# Naval Aerospace Medical Research Lab., Pensacola, Fla.

NUCLEAR EMULSION MEASUREMENTS OF THE ASTRONAUTS' RADIATION EXPOSURE ON THE APOLLO-SOYUZ MISSION

Hermann J. Schaefer and Jeremiah J. Sullivan 23 Jun. 1976 23 p refs

(NASA Order T-81D)

(NASA-CR-150916; NAMRL-1228) Avail: NTIS HC $3.50 CSCL 06R

On the Apollo-Soyuz mission each astronaut carried one passive dosimeter containing nuclear photographic emulsions, plastic foils, TLD chips, and neutron-activation foils for recording radiation exposure. This report is limited to the presentation of data retrieved from nuclear emulsions. Protons, most of them trapped particles encountered in numerous passes through the South Atlantic Anomaly, contributed by far the largest share to the mission dose. Their linear energy transfer (LET) spectrum was established from track and grain counts in a G.5 emulsion which is used for medium and high energies, and from ender counts in a K.2 emulsion which is used for low energies. The total mission fluence of protons was found to be equivalent to a unidirectional beam of 448,500 square centimeters. The broad spectrum was broken down into small LET intervals, which allowed for the computation of absorbed doses and dose equivalents.

The totals are 51 millirad and 74 millirem. Counts of disintegration stars in K.2 emulsion are incomplete at present. While a total of 467 stars were identified, counting their prong numbers is still in progress. It was concluded that the Apollo-Soyuz astronauts' radiation exposure as such did not contain anything out of the ordinary that would seem to require special attention. Author

N76-31896*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATIONS OF LUMINESCENT SYSTEMS TO INFECTIOUS DISEASE METHODOLOGY
Grace Lee Picciolo, E. W. Chappelle, J. W. Deming, M. A. McGarry, D. A. Nibley, H. Okrend, and R. R. Thomas Sep. 1976 88 p refs Submitted for publication
(NASA-TM-X-71190; X-726-76-212) Avail: NTIS HC $5.00 CSCL 06E

The characterization of a clinical sample by a simple, fast, accurate, automatable analytical measurement is important in the management of infectious disease. Luminescence assays offer methods rich with options for these measurements. The instrumentation is common to each assay, and the investment is reasonable. Three general procedures were developed to varying degrees of completeness which measure bacterial levels by measuring their ATP, FMN and iron porphyrins. Bacteriuria detection and antibiograms can be determined within half a day. The characterization of the sample for its soluble ATP, FMN or prophyrins was also performed. Author

N76-31897# Los Alamos Scientific Lab., N.Mex.
STATUS REPORT ON ELECTRONIC IDENTIFICATION
D. M. Holm, R. E. Bobbett, A. R. Koelle, J. A. Landt, W. M. Sanders, S. W. Depp, and J. C. Hensley 1975 11 p refs Presented at Ann. Meeting of the US Animal Health Assoc., Portland, Oreg., 3 Nov. 1975
(Contract W-7405-eng-36)
(LA-UR-75-2312; Conf-751161-1) Avail: NTIS HC $3.50

A significant milestone was passed in September 1975 with the successful operation of a subdermally implanted, temperature indicating transponder having hybrid circuitry. This transponder had no batteries and showed that an implant transponder could be powered by an external microwave beam and transmit encoded temperature information back to the receiver. The encoding of temperature was done because it was very similar to identification, but required much less circuitry. The microwave power levels at the animal skin were well within established safety limits. Additional work needs to be performed on optimizing circuitry and antenna design. Author (ERA)

N76-31898# United Nations Scientific Committee on the Effects of Atomic Radiation.
DOSIMETRIC IMPLICATIONS OF THE EXPOSURE TO THE NATURAL SOURCES OF IRRADIATION
D. J. Beninson, A. Bouville (Commissariat a l'Energie Atomique, France), B. J. OBrien (Inst. of Nuclear Physics, New Zealand), and J. O. Snihs (National Inst. of Radiation Protection, Sweden) 1975 54 p refs Presented at the Intern. Symp. on Areas of High Natural Radioactivity, Pocos de Caldas, Brazil, 16-20 Jun. 1975
(CEA-CONF-3113; Conf-750671-3) Avail: ERDA Depository Libraries HC $4.50

Natural radiation is of two origins, extraterrestrial and terrestrial. Extraterrestrial radiation originates in outer space as primary cosmic rays and reaches the atmosphere, with which the incoming energy and particles interact, giving rise to secondary cosmic rays to which living beings on the earth's surface are exposed. Terrestrial radiation is emitted from radioactive nuclides present in varying amounts in all soils and rocks, the atmosphere and the hydrosphere, and from those radionuclides that, transferred to man through food chains or by inhalation, are deposited in his tissues. Terrestrial radioactivity, therefore, leads to both external and internal exposure. Data are summarized as the radiation dose and dose rate to human populations from natural radiation. NSA

N76-31899# California Univ., Livermore. Lawrence Livermore Lab.
PERSONNEL MONITORING MEASUREMENTS
R. V. Griffith 23 Feb. 1976 11 p refs Presented at NBS Symp. on Measurements for the Safe Use of Radiation, Gaithersburg, Md., 1 Mar. 1976 Sponsored by ERDA
(UCRL-77816; Conf-760301-2) Avail: NTIS HC $3.50

The two most important personnel monitoring problems are development of personnel neutron dosimeter and in-vivo measurement of plutonium at sublung burden levels. Although there are a few techniques under development to attack these problems, satisfactory long term solutions will require much more work. As the development in nuclear power and medicine continue, the need for solutions to these problems will intensify. Author (NSA)

N76-31900# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
TABULATED CHARACTERISTICS OF A PROPOSED 2 DEG FUNDAMENTAL OBSERVER
J. J. Vos 1975 28 p refs
(IZF-1975-9; TDCK-67176) Avail: NTIS HC $4.00

Tables of chromaticities, color matching functions, and receptor system primaries for a 2 deg fundamental observer are presented as well as tables of receptor sensitivities and intraocular absorption. ESA

N76-31901# Walter Reed Army Inst. of Research, Washington, D.C.
THE INFLUENCE OF OXYHEMOGLOBIN AFFINITY ON TISSUE OXYGEN CONSUMPTION
Alden H. Harken and Monty Woods 27 Aug. 1975 8 p Submitted for publication
(DA Proj. 3A1-62110-A-821)
(AD-A023093) Avail: NTIS CSCL 06/16

In an intact animal or patient, any shift in oxyhemoglobin affinity is inevitably associated with concurrent fluctuation in numerous other determinants of oxygen delivery. For this reason, the influence of hemoglobin affinity for oxygen on tissue oxygen consumption has been incompletely evaluated. The purpose of this study was to investigate the influence of oxyhemoglobin affinity as the sole variable of oxygen delivery in an isolated perfused canine hindlimb. A membrane lung system which allowed precise control of blood flow, temperature, arterial oxygen content and arterial pH was established. Twelve isolated canine hindlimbs were alternatively perfused with autologous stored and fresh blood in parallel perfusion systems. A decreased hemoglobin affinity for oxygen appeared to permit increased oxygen off-loading at the tissue level. Author (GRA)

N76-31902# School of Aerospace Medicine, Brooks AFB, Tex.
THE TONE-COUNT AUDIOMETRIC COMPUTER Progress Report, Jan. 1973 - Dec. 1974
Charles R. Meyer, Harrell C. Sutherland, Jr., and Francis A. Brogan Dec. 1975 35 p refs
(AF Proj. 7996)
(AD-A022448; SAM-TR-75-50) Avail: NTIS CSCL 06/5

This paper describes a means of implementing a modified Hughson-Westlake procedure in automated audiometry using a small audiometric computer and a tone-counting technique. The detailed description of the audiometric computer includes its operation manual, programmed flow chart, and circuit schematics. Author (GRA)

N76-31903# School of Aerospace Medicine, Brooks AFB, Tex.
RETINAL CHANGES INDUCED BY HEAVY PARTICLES: A NEW THERAPY MODALITY Interim Report, Jan. - Dec. 1973
David M. Hunter, Charles H. Bonney, John E. Pickering, and Jerome H. Krupp Nov. 1975 15 p refs
(AF Proj. 1921)
(AD-A022449; SAM-TR-75-36; SAM-Review-6-75) Avail: NTIS CSCL 06/5

The effects of accelerated oxygen nuclei upon the retina of a nonhuman primate have been investigated. This simulated deep

space radiation affords the possibility of delivering great quantities of energy (at a predetermined depth) within the eye, while but minimally irradiating interposing tissues. When compared with the clinical results following the use of cobalt plaques the oxygen ion has demonstrated a significant compression of both time and dose in achieving the same degree of tissue effect. Therefore, the possibility obtains for a greater local irradiation of intraocular neoplasta with a sharp reduction of radiation damage to surrounding non-neoplastic ocular tissues. GRA

N76-31904# Vermont Univ., Burlington. Dept. of Pathology.
ANALYSIS AND MEASUREMENT OF THE EFFECTS OF MATERIALS ON BLOOD LEUKOCYTES, ERYTHROCYTES AND PLATELETS Annual Report, 1 Dec. 1974 - 30 Nov. 1975
Bert K. Kusserow and Rodney W. Larrow 1 Jan. 1976 97 p refs
(Grant HB-5-2939)
(PB-252720/8; NIH-N01-HR-52939-5) Avail: NTIS HC $5.00 CSCL 06L

Continuing experimental work in refinement and use of an in vivo renal thromboembolus test system for the evaluation of promising and well characterized new biomaterials is described. The renal embolus test system involves the intra-aortic implantation of a cylindrical test ring and the use of the renal vascular bed and parenchyma as a sensitive biologic indicator system of thromboembolic sequellae. A number of promising synthetic materials were evaluated. Severity of implant thrombosis and renal infarct patterns is noted and recorded. Topographical mapping of mural and junctional ring thrombotic deposits is schematically demonstrated. Several materials demonstrate noteworthy resistance to thrombo-embolic complications. GRA

N76-31905*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A PARAMETRIC INVESTIGATION OF RIDE QUALITY RATING SCALES
Thomas K. Dempsey, Glynn D. Coates (Old Dominion Univ.), and Jack D. Leatherwood Sep. 1976 37 p refs
(NASA-TM-X-73946) Avail: NTIS HC $4.00 CSCL 05E

The relative merits of various category scales for the prediction of human discomfort response to vibration and the mathematical relationships that allow for transformations of subjective data from one scale to another scale were determined. A total of 16 category scales were studied and these represented various parametric combinations of polarity, scale type, and number of scalar points. Sixteen subject groups were used and each subject group evaluated its comfort/discomfort to vertical sinusoidal vibration using one of the rating scales. The passenger ride quality apparatus which can expose six subjects simultaneously to predetermined vibrations was utilized. The vibration stimuli were composed of repeats of selected sinusoidal frequencies applied at each of nine peak floor acceleration levels. A higher degree of reliability and discriminability was generally obtained from unipolar continuous type scales containing either seven or nine scalar points as opposed to the other scales investigated. S.M.

N76-31906# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
HIGHER ORDER ADAPTIVE TRAINING SYSTEMS Final Report, May 1975 - Feb. 1976
Wallace Feurzeig, George Lukas, and A. W. F. Huggins Feb. 1976 42 p refs
(Contract N61339-75-C-0104)
(AD-A023594; BBN-3220; NAVTRAEQUIPC-75-C-0104-4) Avail: NTIS CSCL 05/9

A computer-based instrument flight simulation system, ORLY, has been developed as the framework for an automated diagnostic and training facility. ORLY-based protocol experiments were designed in which student pilot difficulties shown in the course of carrying out IFR tasks were described and diagnosed by instructor pilots. Case studies of initial instructor protocols are described. Protocol analysis procedures and problems are discussed. GRA

N76-31907# Singer Co., Binghamton, N.Y. Simulation Products Div.
ADVANCED SIMULATION IN UNDERGRADUATE PILOT TRAINING: VISUAL DISPLAY DEVELOPMENT Final Report, Mar. 1971 - Oct. 1975
Lawrence Nass (Farrand Optical Co., Inc., Valhalla, N. Y.), Peter Seats (Thomas Electronics, Inc., Wayne, N. J.), and William B. Albery Dec. 1975 123 p refs
(Contract F33615-71-C-1255)
(AD-A022962; AFHRL-TR-75-59(6)) Avail: NTIS CSCL 05/9

Visual simulation and its application to flying training is in its infancy. The development of the two visual display systems including the infinity optics, support structures, and 36-inch diameter (the world's largest) cathode ray tube described in this report has already produced a worthwhile legacy to the state of the art visual simulation. The development of the visual display systems for the advanced simulator for undergraduate pilot training (ASUPT) is generally described as three separate efforts: (1) in-line infinity optics, or pancake window development, (2) dodecahedron structure development, and (3) cathode ray tube (CRT) development. The genesis of all three of these efforts represents individual contributions to the state of the art. The pancake windows are the largest of their kind ever developed. The simulator for air-to-air combat employs similar windows, structures, and CRTs but the windows and CRTs are scaled-down versions of the ASUPT designs. The ASUPT visual display structures were tested under dynamic conditions on a motion platform in early 1972; the structural integrity of the dodecahedron design was verified. The CRTs represent, perhaps, the most important element of the ASUPT. For it is the remarkable development of these, the world's largest, hand-crafted TV tubes that not only paced the entire progress of the program, but also provided the ASUPT with its 'eyes' and made it the valuable asset that it is today. GRA

N76-31908*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Biotechnology Organization.
DESIGN, FABRICATION AND TEST OF A TRACE CONTAMINANT CONTROL SYSTEM
28 Nov. 1975 356 p refs
(Contract NAS1-11526)
(NASA-CR-147860; LMSC-D462467) Avail: NTIS HC $10.50 CSCL 06K

A trace contaminant control system was designed, fabricated, and evaluated to determine suitability of the system concept to future manned spacecraft. Two different models were considered. The load model initially required by the contract was based on the Space Station Prototype (SSP) general specifications SVSK HS4655, reflecting a change from a 9 man crew to a 6 man crew of the model developed in previous phases of this effort. Trade studies and a system preliminary design were accomplished based on this contaminant load, including computer analyses to define the optimum system configuration in terms of component arrangements, flow rates and component sizing. At the completion of the preliminary design effort a revised contaminant load model was developed for the SSP. Additional analyses were then conducted to define the impact of this new contaminant load model on the system configuration. A full scale foam-core mock-up with the appropriate SSP system interfaces was also fabricated. Author

N76-31909*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Biotechnology Organization.
DESIGN, FABRICATION, AND TEST OF A TRACE CONTAMINANT CONTROL SYSTEM. APPENDIXES A AND B
28 Nov. 1975 136 p
(Contract NAS1-11526)
(NASA-CR-147861; LMSC-D462467-App-A; LMSC-D462467-App-B) Avail: NTIS HC $6.00 CSCL 06K

Engineering specifications of a trace contaminant control system designed for the Space Station Prototype (SSP) were given. These were divided into two appendices: (1) a list of nonmetallic materials used, and (2) engineering drawings of the overall system, sub-assemblies, and components. Y.J.A.

N76-31910*# Life Systems, Inc., Cleveland, Ohio.
ONE-MAN ELECTROCHEMICAL AIR REVITALIZATION SYSTEM EVALUATION Final Report, 1 Sep. 1975 - 31 Aug. 1976
F. H. Schbert, R. D. Marshall, T. M. Hallick, and R. R. Woods. Jul. 1976 67 p refs
(Contract NAS9-14658)
(NASA-CR-147882; LSI-ER-284-4) Avail: NTIS HC $4.50 CSCL 06K

A program to evaluate the performance of a one man capacity, self contained electrochemical air revitalization system was successfully completed. The technology readiness of this concept was demonstrated by characterizing the performance of this one man system over wide ranges in cabin atmospheric conditions. The electrochemical air revitalization system consists of a water vapor electrolysis module to generate oxygen from water vapor in the cabin air, and an electrochemical depolarized carbon dioxide concentrator module to remove carbon dioxide from the cabin air. A control/monitor instrumentation package that uses the electrochemical depolarized concentrator module power generated to partially offset the water vapor electrolysis module power requirements and various structural fluid routing components are also part of the system. The system was designed to meet the one man metabolic oxygen generation and carbon dioxide removal requirements, thereby controlling cabin partial pressure of oxygen at 22 kN/sq m and cabin pressure of carbon dioxide at 400 N/sq m over a wide range in cabin air relative humidity conditions. Author

N76-31911# Arizona State Univ., Tempe.
VISUAL SCANNING: COMPARISONS BETWEEN STUDENT AND INSTRUCTOR PILOTS Final Report
Joseph DeMaio, Stanley Parkinson, Barry Leshowitz, John Crosby, and Jack A. Thorpe. Jun. 1976 34 p refs
(AF Proj. 2313)
(AD-A023634; AFHRL-TR-76-10) Avail: NTIS CSCL 06/16

The performance of instructor pilots and student pilots was compared in two visual scanning tasks. In the first task both groups were shown slides of T-37 instrument displays. Some slides contained a significant deviation from a pre-determined straight and level course, and the task was to detect the error as quickly as possible. Instructor pilots detected errors faster and with greater accuracy than student pilots, thus providing evidence for the validity of the procedures employed. However, contrary to the concept of a fixed cross-check, student pilots showed a greater tendency to employ a systematic search pattern than did instructor pilots. This result suggests that rather than using a rigid scanning pattern, instructor pilots, by virtue of their additional flight experience, use a flexible scanning strategy which allows them to emphasize important or difficult aspects of the display. In the second experiment the attention diagnostic method task was employed to determine if the experience in visual scanning obtained in the flight situation would transfer to a novel scanning task. In the first session there were no differences in response latency between instructor pilots, student pilots, and a group of university students. Instructor pilots, however, showed a significant linear decrease in latency over the course of eight sessions while this trend was absent in the other two groups. This suggests that instructor pilots learn to attend to critical features more efficiently than do individuals with little or no flight experience. The results of the present experiments recommend the use of a variety of scanning tasks in the UPT program to facilitate the more rapid development of adaptive scanning strategies. Author (GRA)

N76-31912# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE CLOSED-LOOP PERFORMANCE AND TRACKING STABILITY OF A DIRECT SIDE FORCE CONTROLLER M.S. Thesis
Robert A. Lancaster, Jr. Jan. 1975 157 p refs
(AD-A022863; GAE/MC/75D-9) Avail: NTIS CSCL 05/8

A closed-loop analysis was performed to determine the desirability and effectiveness of using direct side force control as a means of achieving lateral trajectory control in accomplishing a given tracking task. The specific task investigated was one of an aircraft air-to-ground weapon delivery modeled as a closed-loop compensatory system with the pilot in the loop. The study uses a linear systems approach in conducting a closed-loop analysis of the stability of the tracking solution of a Cornell Aeronautical Laboratory direct side force control system mechanization. Human operator theory is employed in investigating the closed-loop performance of the pilot-vehicle system. GRA

N76-31913# Navy Experimental Diving Unit, Panama City, Fla.
EVALUATION OF THE DRAEGER LAR V PURE OXYGEN SCUBA Final Report, Jul. - Sep. 1975
H. N. Paulsen and Ronald E. Jarvi 8 Oct. 1975 44 p refs
(AD-A022585; NEDU-11-75) Avail: NTIS CSCL 13/10

The Draeger LAR V scuba is a pure oxygen self contained underwater breathing apparatus designed and manufactured in the Federal Republic of Germany. The scuba is completely closed circuit and incorporates a demand type oxygen supply. Gas purification is accomplished by means of a refillable CO_2 absorbant canister. The LAR V works on pure oxygen. This evaluation was conducted to determine safe operational capabilities and limitations of the LAR V with respect to training and operational use by Naval Special Warfare Divers. It was found that the LAR V is equal to, and in many respects superior to the U.S. Navy Emerson scuba. The Draeger incorporates many inherent design features which makes it easier to pre/post dive and to maintain than the Emerson closed circuit scuba. GRA

N76-31914# Illinois Univ., Urbana. Coordinated Science Lab.
REAL TIME ADAPTIVE MODELING OF THE HUMAN CONTROLLER WITH APPLICATION TO MAN-COMPUTER INTERACTION
Kenneth Dean Enstrom Jan. 1976 66 p refs
(Contracts DAAB07-72-C-0259; F33615-73-C-1238)
(AD-A023589; R-715; UILU-ENG-76-2203) Avail: NTIS CSCL 09/2

When a human and computer are joined forming a human-computer system, the two decision-makers must work together if the human's workload is to be reduced and overall system performance maintained or improved. Independent actions by each decision maker could prove to be counterproductive. This thesis proposes that cooperation between decision makers can be fostered by using the computer to monitor the actions of the human. Then, the human can act freely, and the computer will use decision policies that do not conflict with the human's current actions, but adapt to them. GRA

N76-31915# School of Aerospace Medicine, Brooks AFB, Tex.
A PROPOSED EMERGENCY PASSENGER-OXYGEN SYSTEM FOR KC-135 AIRCRAFT: AN EVALUATION Interim Report, Sep. 1974 - Apr. 1975
Thomas R. Morgan Dec. 1975 10 p
(AD-A023447; SAM-TR-75-49) Avail: NTIS CSCL 06/11

An emergency passenger-oxygen system for KC-135 aircraft was evaluated in four decompression tests to a simulated cabin altitude of 40,000 feet (12,192 m). The system, an MD-1 (high pressure) oxygen storage assembly coupled to a CRU-78 standard emergency oxygen mask, provided adequate oxygenation of all subjects throughout the tests. The brass nipple released as a consequence of MD-1 activation showed a tendency to later lodge in the oxygen mask hose. A modification eliminating this possibility and observations upon the system's expected effectiveness are discussed. GRA

N76-31916# National Inst. for Occupational Safety and Health, Morgantown, W.Va. Testing and Certification Lab.
EXHALATION VALVE LEAKAGE TEST Respirator Test Procedure Report
Nancy J. McGinnis Feb. 1976 24 p refs Sponsored by HEW
(PB-252692/9; NIOSH/JC/R-005) Avail: NTIS HC $3.50 CSCL 06K

A procedure is described to enable the reader to perform exhalation valve leakage tests on respirators as required by Title 30 CFR, Part 11. The steady state leakage rate of the exhalation valve is measured in milliliters per unit time and on the positive pressure side of the exhalation valve. GRA

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